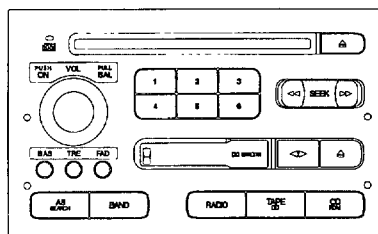


Service Manual

PIONEER®
The Art of Entertainment
SAAB



ORDER NO.
CRT1906

HEAD UNIT(3 in 1)

FX-M2316ZSA ES

VEHICLE	PRODUCED AFTER	PART No.	PIONEER MODEL No.
SAAB9000	1997	4616942	FX-M2316ZSA/ES

COMPACT
disc
DIGITAL AUDIO

NOTE:

- See the service manual CX-597(CRT1811) for the CD mechanism description, disassembly and circuit description.
- The CD mechanism employed in this model is one of CX-844 series.
- Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.
"Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.
- See the separate manual CX-631(CRT1640) for the cassette mechanism description.
- The cassette mechanism assy employed in this model is one of X-2L series
- How to cancel the security system for service.

To cancel the security function, turn on the back-up power while pressing the Tape eject button and the Power button (Volume knob) at the same time. To re-activate the security system, turnoff the power (or the back-up power).

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1. SAFETY INFORMATION

● CD Player Service Precautions

1. For pickup unit(CXX1230) handling,please refer to"Disassembly"(CX-597 Service Manual CRT1811).
During replacement,handling precautions shall be taken to prevent an electrostatic discharge(protection by a short pin).

2. During disassembly,be sure to turn the power off since an internal IC might be destroyed when a connector is plugged or unplugged.

2. EXPLODED VIEWS AND PARTS LIST

2.1 PACKING

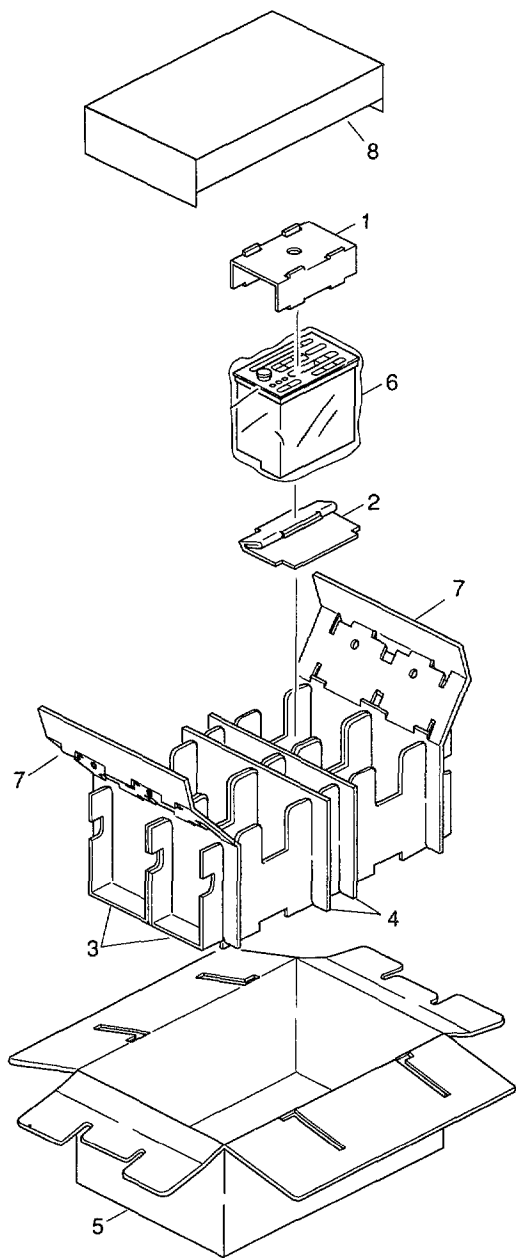


Fig.1

● Parts List

Mark No.	Description	Part No.
1	Protector	CHP1912
2	Protector	CHP1823
3	Protector	CHP1825
4	Protector	CHP1826
5	Contain Box	CHL3202
6	Cover	CEG1057
7	Protector	CHP1824
8	Cover	CHW1584

2.2 EXTERIOR

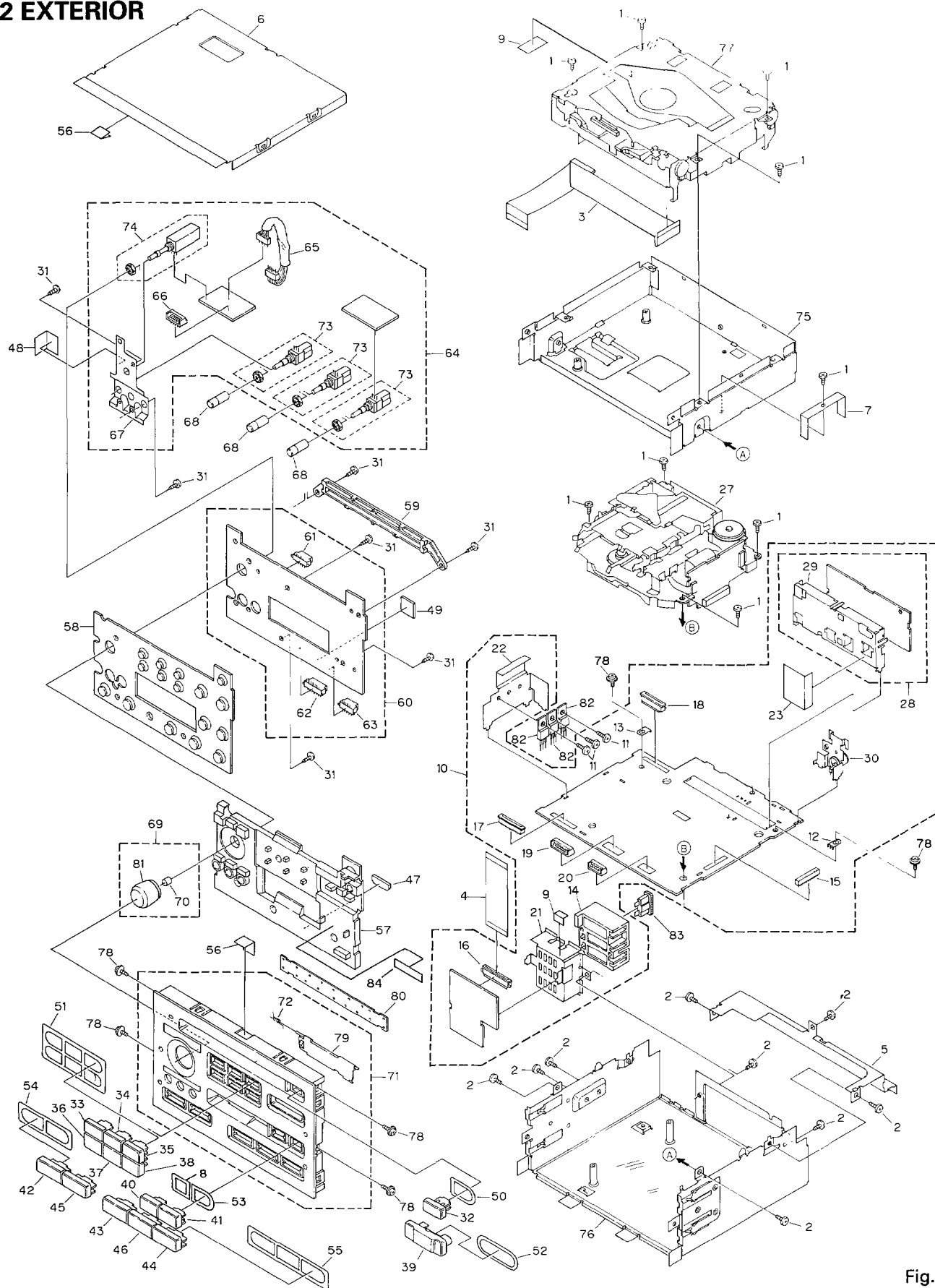


Fig.2

NOTES:

● Parts marked by " * " are generally unavailable because they are not in our Master Spare Parts List.

● Parts List

Mark	No. Description	Part No.	Mark	No. Description	Part No.
	1 Screw	BMZ26P050FMC		46 Button(TAPE)	CAC4378
	2 Screw	BMZ30P050FMC		47 Spacer	CNM4949
	3 Connector	CDE4930		48 Spacer	CNM4982
	4 Connector	CDE4952		49 Spacer	CNM4983
	5 Case	CNB1958		50 Insulator	CNM5135
	6 Case	CNB1959		51 Insulator	CNM5136
	7 Holder	CNC5985		52 Insulator	CNM5137
	8 Insulator	CNM5298		53 Insulator	CNM5297
	9 Insulator	CNM5000		54 Insulator	CNM5139
	10 Tuner Mother Assy	CWM4382		55 Insulator	CNM5140
	11 Screw	BMZ30P060FMC		56 Insulator	CNM5247
	12 Terminal(CN803)	CKF1059		57 Lighting Conductor	CNV4220
	13 Terminal(CN804)	CKF1059		58 Rubber	CNV4222
	14 Connector(CN851)	CKM1088		59 Holder	CNV4535
	15 Connector(CN651)	CKS1730		60 Key Board Unit	CWM4355
	16 Connector(CN852)	CKS1963		61 Connector(CN903)	CKS3340
	17 Connector(CN701)	CKS2255		62 Connector(CN901)	CKS3341
	18 Connector(CN801)	CKS2774		63 Connector(CN902)	CKS3341
	19 Connector(CN601)	CKS2830		64 Volume Unit	CWM4511
	20 Connector(CN602)	CKS2830		65 Cord(CN904)	CDE4761
	21 Holder	CNC5906		66 Connector(CN905)	CKS2829
	22 Holder	CNC5986		67 Holder	CNC6818
*	23 Insulator	CNM4912		68 Knob Assy	CXA7840
	24			69 Knob Assy	CXA7839
	25			70 Spring	CBL-108
	26			71 Grille Unit	CXA7838
	27 Cassette Mechanism Module	EXK3210		72 Spring	CBH1371
	28 Tuner Unit	CWE1422		73 Volume(VR902,903,904)	CCS1089
	29 Holder	CNC6122		74 Volume(VR901)	CSD1031
	30 Antenna Unit(CN501)	CXA9328		75 Chassis Unit	CXA7830
	31 Screw	BPZ26P100FMC		76 Chassis Unit	CXA7831
	32 Button(≡)	CAC4365		77 CD Mechanism Module(S7)	CXK5022
	33 Button(1)	CAC4366		78 Screw	IMS30P050FMC
	34 Button(2)	CAC4367	*	79 Door	CAT1684
	35 Button(3)	CAC4368	*	80 Cover	CNM4768
	36 Button(4)	CAC4369			
	37 Button(5)	CAC4370	*	81 Knob	CAA1383
	38 Button(6)	CAC4371		82 Transistor(Q802,815,818)	2SB1185
	39 Button(SEEK)	CAC4372		83 Fuse(FU851)	CEK1005
	40 Button(< ≡ >)	CAC4373		84 Film	CNM5299
	41 Button(≡)	CAC4374			
	42 Button(AS)	CAC4375			
	43 Button(RADIO)	CAC4483			
	44 Button(CD)	CAC4379			
	45 Button(BAND)	CAC4466			

2.3 CD MECHANISM MODULE

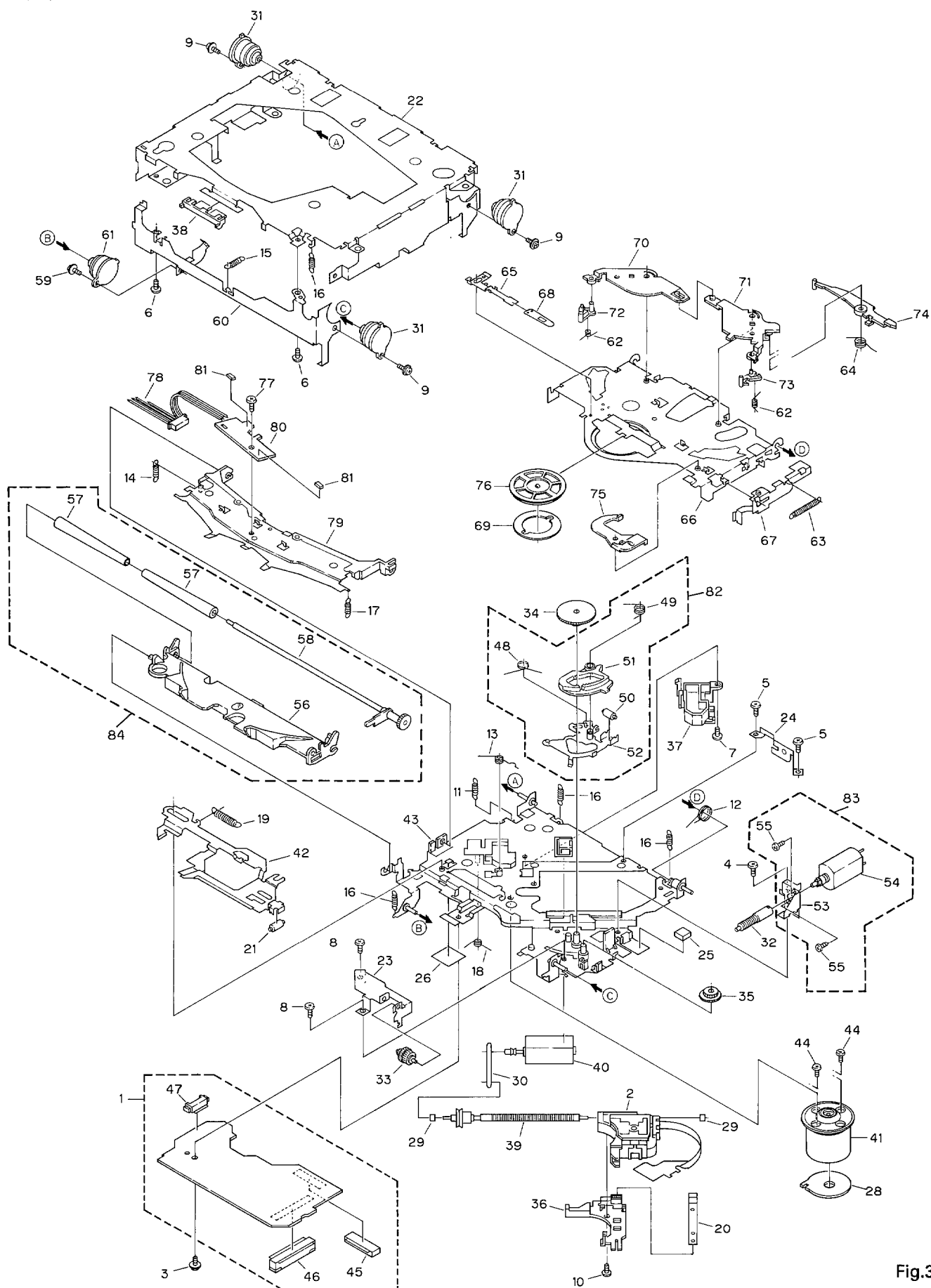


Fig.3

● Parts List

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Control Unit	CWX2096	46	Connector(CN701)	CKS2774
2	Pickup Unit(Service)	CXX1230	47	Connector(CN801)	CKS2196
3	Screw	IMS26P035FMC	48	Spring	CBH1832
4	Screw	BMZ20P025FMC	49	Spring	CBH1833
5	Screw	BMZ20P040FMC	50	Roller	CLA2627
6	Screw	BSZ20P040FMC	51	Arm	CNV4136
7	Screw(M2×3)	CBA1077	52	Arm Unit	CXA8565
8	Screw(M2×2)	CBA1250	53	Bracket	CNC6056
9	Screw(M2×5)	CBA1296	54	Load Motor Unit(M3)	CXA8702
10	Screw(M2×3.85)	CBA1362	55	Screw	JFZ20P025FMC
11	Spring	CBH1724	56	Arm	CNV4120
12	Spring	CBH1729	57	Roller	CNV4509
13	Spring	CBH1730	58	Gear Unit	CXA8701
14	Spring	CBH1731	59	Screw(M2×5)	CBA1296
15	Spring	CBH1732	60	Frame	CNC5797
16	Spring	CBH1745	61	Damper	CNV3974
17	Spring	CBH1848	62	Spring	CBH1736
18	Spring	CBH1849	63	Spring	CBH1863
19	Spring	CBH1939	64	Spring	CBH1945
20	Spring	CBL1214	65	Spring	CBL1269
21	Roller	CLA2627	66	Arm	CNC5799
22	Frame	CNC5796	67	Lever	CNC6054
23	Bracket	CNC5871	68	Spacer	CNM3315
* 24	Bracket	CNC6376	69	Sheet	CNM4849
25	Cushion	CNM3917	70	Arm	CNV4122
26	Sheet	CNM4873	71	Arm	CNV4123
27			72	Arm	CNV4124
28	PCB	CNP4230	73	Arm	CNV4125
29	Bearing	CNR1415	74	Arm	CNV4138
30	Belt	CNT1071	75	Arm	CNV4139
31	Damper	CNV3974	76	Clamper	CNV4140
32	Gear	CNV4128	77	Screw(M2×2)	CBA1250
33	Gear	CNV4129	78	Connector(CN1)	CDE4576
34	Gear	CNV4857	79	Arm	CNC5801
35	Gear	CNV4131	* 80	Gathering PCB	CNX2445
36	Holder	CNV4663	81	Photo-transistor(Q1, 2)	CPT-230S-X
37	Holder	CNV4664	82	Elbow Arm Assy	CXA8889
38	Guide	CNV4484	83	Load Motor Assy	CXA8891
39	Screw Unit	CXA8699	84	LO Arm Assy	CXA8892
40	CRG Motor Unit(M2)	CXA8986			
41	Motor Unit(M1)	CXA8912			
42	Lever Unit	CXA9300			
43	Chassis Unit	CXA9515			
44	Screw	JFZ20P025FMC			
45	Connector(CN101)	CKS1953			

2.4 CASSETTE MECHANISM MODULE

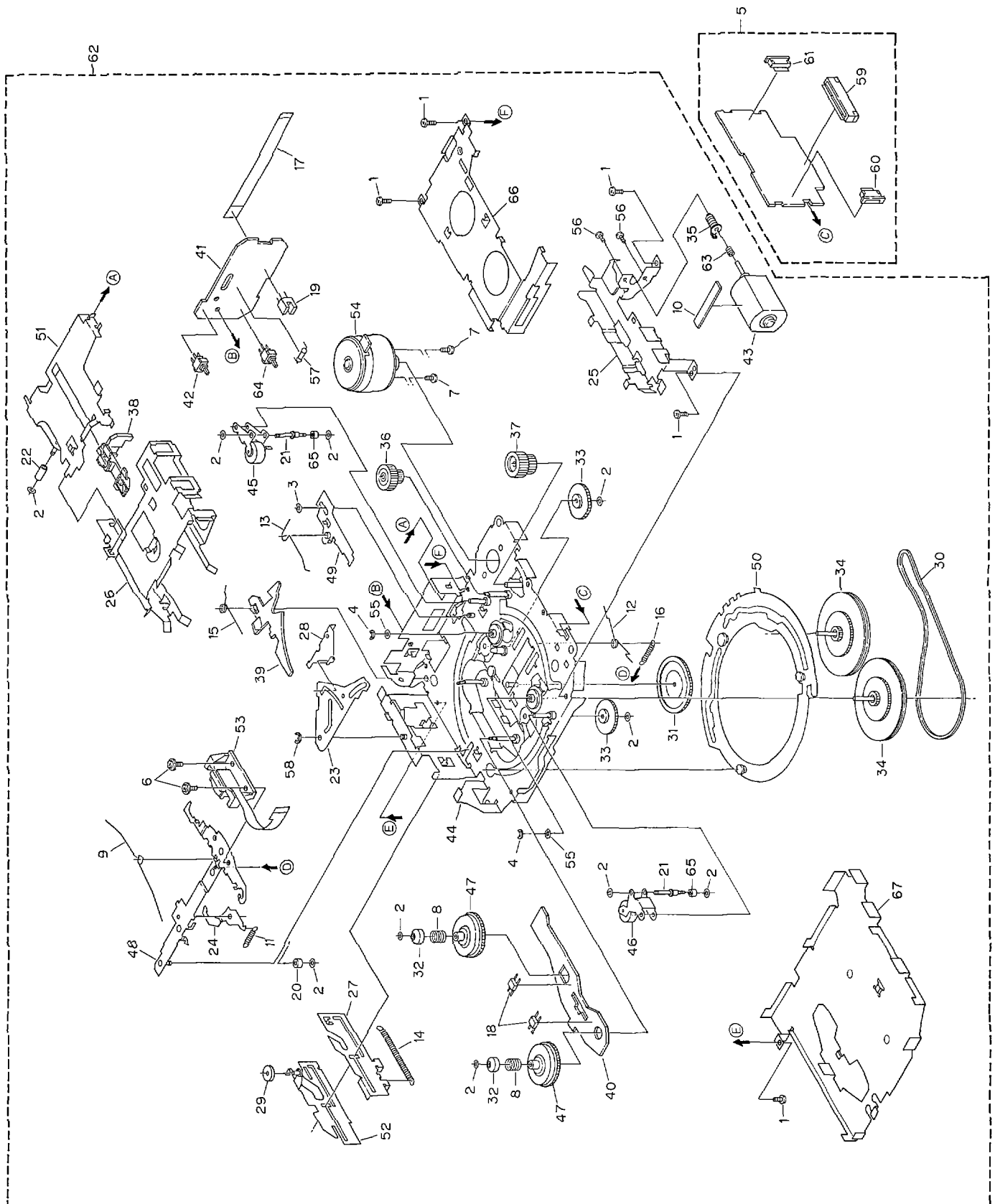


Fig.4

● Parts List

Mark No.	Description	Part No.	Mark No.	Description	Part No.
1	Screw	BSZ20P040FMC	36	Worm Wheel	ENV1440
2	Washer	CBF1037	37	Gear	ENR1028
3	Washer	CBF1038	38	Lever	ENV1442
4	Washer	CBG1003	39	Arm	ENV1445
5	Deck Unit	CWM4527	40	Gathering P.C.Board	ENX1029
6	Screw	EBA1028	41	Gathering P.C.Board	ENX1030
7	Screw	EBA1037	42	Switch(S1)	ESG1004
8	Spring	EBH1531	43	Motor Unit(M2)	EXA1382
9	Spring	EBH1589	44	Chassis Unit	EXA1495
10	Cushion	ENM1034	45	Pinch Roller Unit	EXA1472
11	Spring	EBH1515	46	Pinch Roller Unit	EXA1473
12	Spring	EBH1587	47	Reel Unit	EXA1423
13	Spring	EBH1517	48	Head Base Unit	EXA1434
14	Spring	EBH1518	49	Lever Unit	EXA1438
15	Spring	EBH1519	50	Gear Unit	EXA1389
16	Spring	EBH1537	51	Frame Unit	EXA1476
17	Cord	EDD1015	52	Lever Unit	EXA1439
18	Photo-reflector(EGN2,3)	EGN1004	53	Head Assy(HD1)	EXA1488
19	Photo-interrupter(EGN1)	EGN1005	54	Motor Unit(M1)	EXA1381
20	Roller	ENR1031	55	Washer	HBF-179
21	Shaft	ELA1362	56	Screw	JGZ20P025FNI
22	Roller	ELA1348	57	Resistor(R1)	RD1/4HM181J
23	Arm	ENC1396	58	Washer	YE20FUC
24	Arm	ENC1397	59	Connector(CN251)	CKS1711
25	Guide	ENC1398	60	Connector(CN252)	CKS2127
26	Holder	ENC1417	61	Connector(CN253)	CKS2129
27	Lever	ENC1448	62	Spare Unit	EXA3008
28	Arm	ENC1401	63	Spring	EBH1545
29	Roller	ENR1027	64	Switch(S2)	ESG1004
30	Belt	ENT1027	65	Roller	ENR1023
31	Gear	ENV1347	66	Cover	ENC1412
32	Collar	ENV1508	67	Cover	ENC1413
33	Gear	ENV1350			
34	Flywheel	ENV1410			
35	Worm Gear	ENV1439			

3.2 CD MECHANISM MODULE

A

B

C

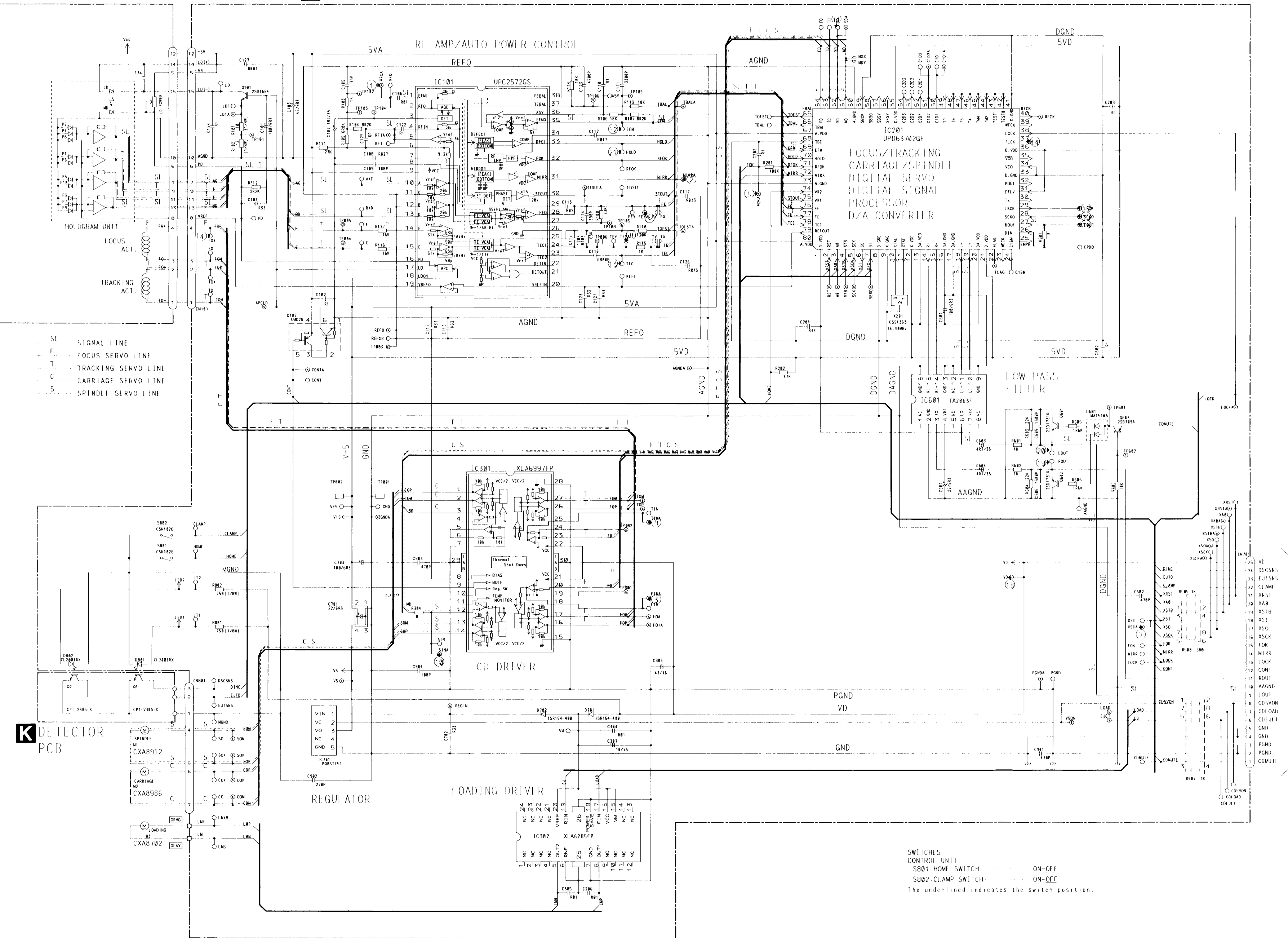
D

E

F

PICKUP UNIT (SERVICE)
(CXX1230)

CONTROL UNIT **G**



A CV721

Fig.6

3.3 TUNER UNIT

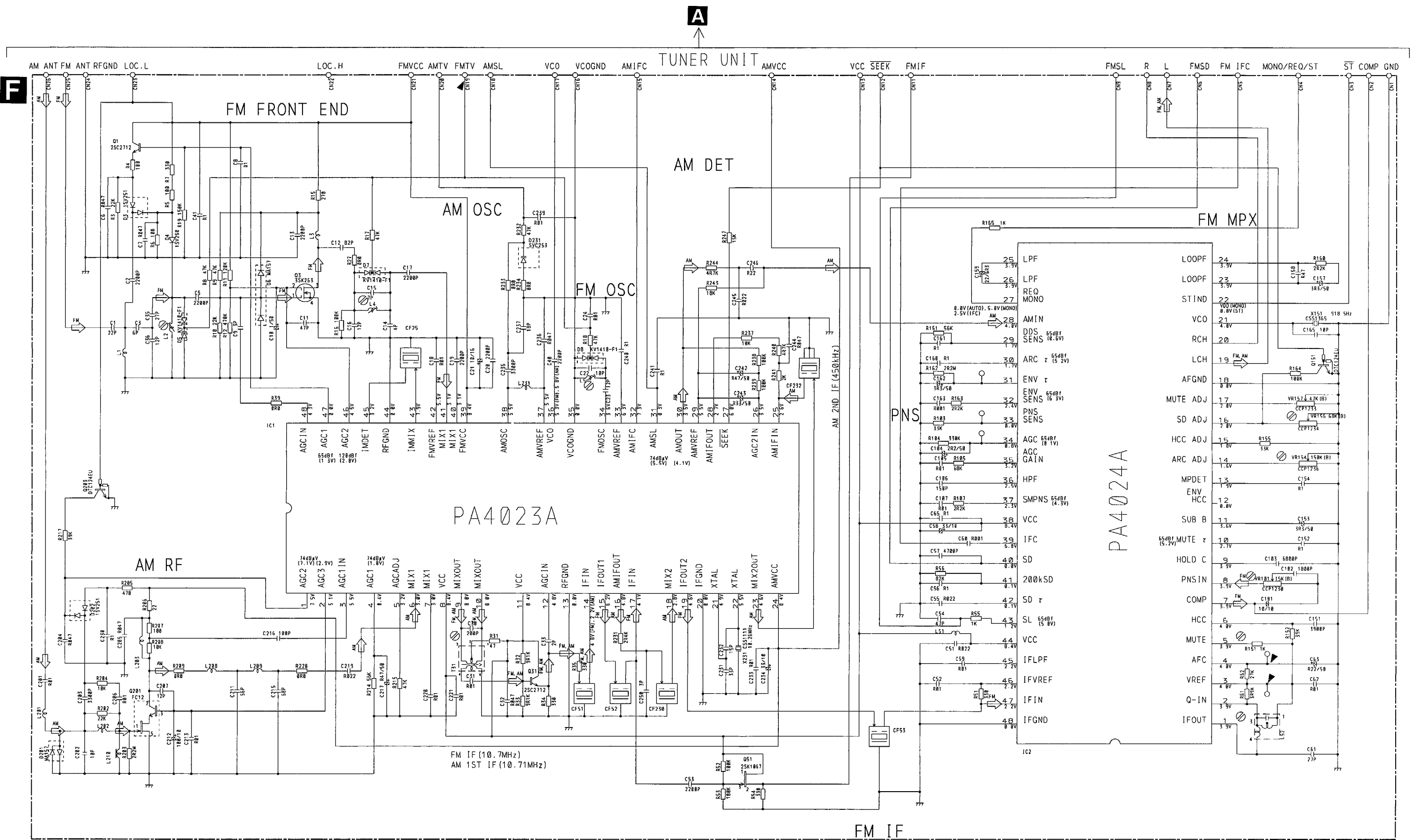


Fig.7

17



Fig.8

4. PCB CONNECTION DIAGRAM

4.1 TUNER MOTHER PCB

NOTE:

The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

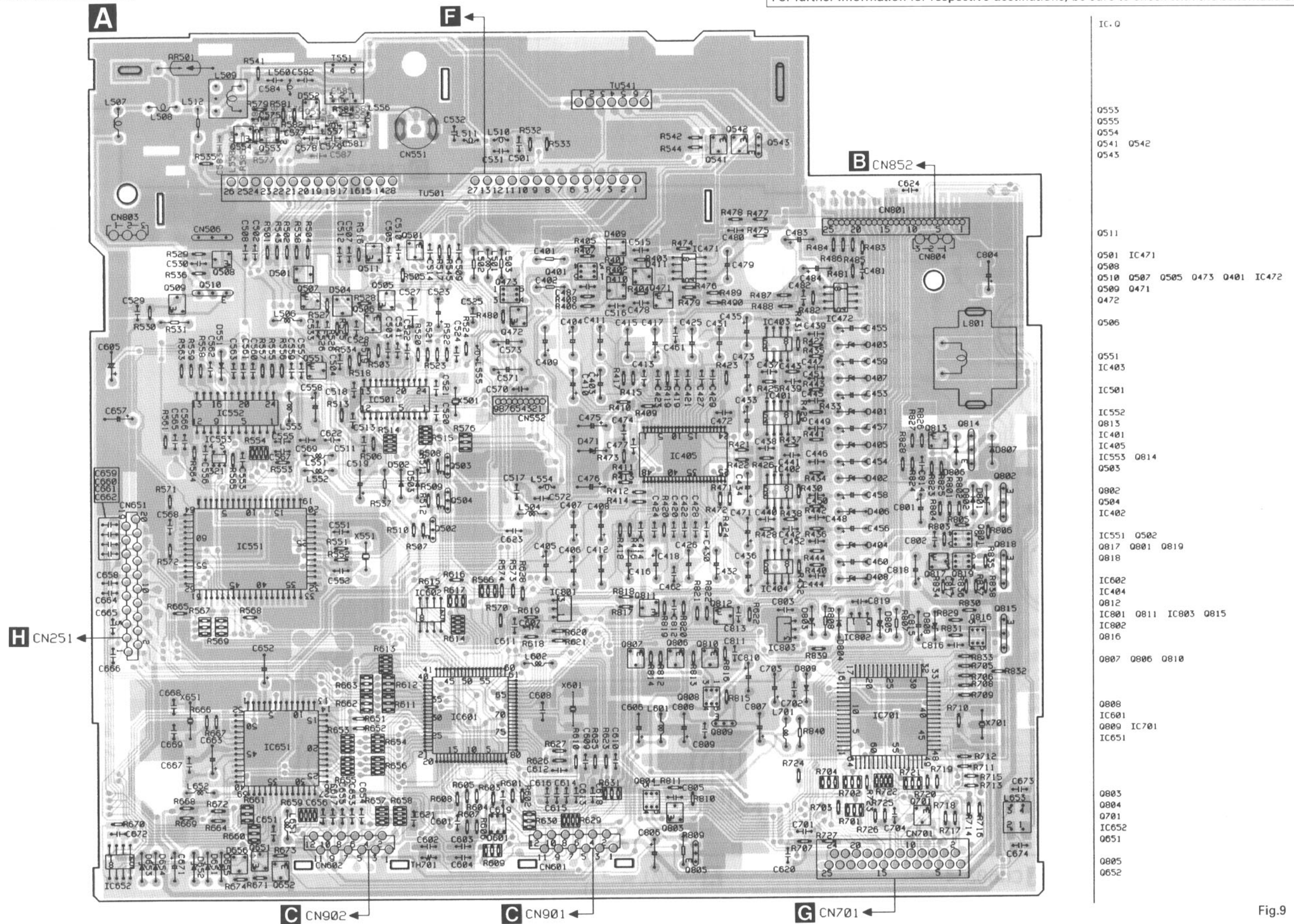


Fig.9

4.2 KEY BOARD UNIT

NOTE:
The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

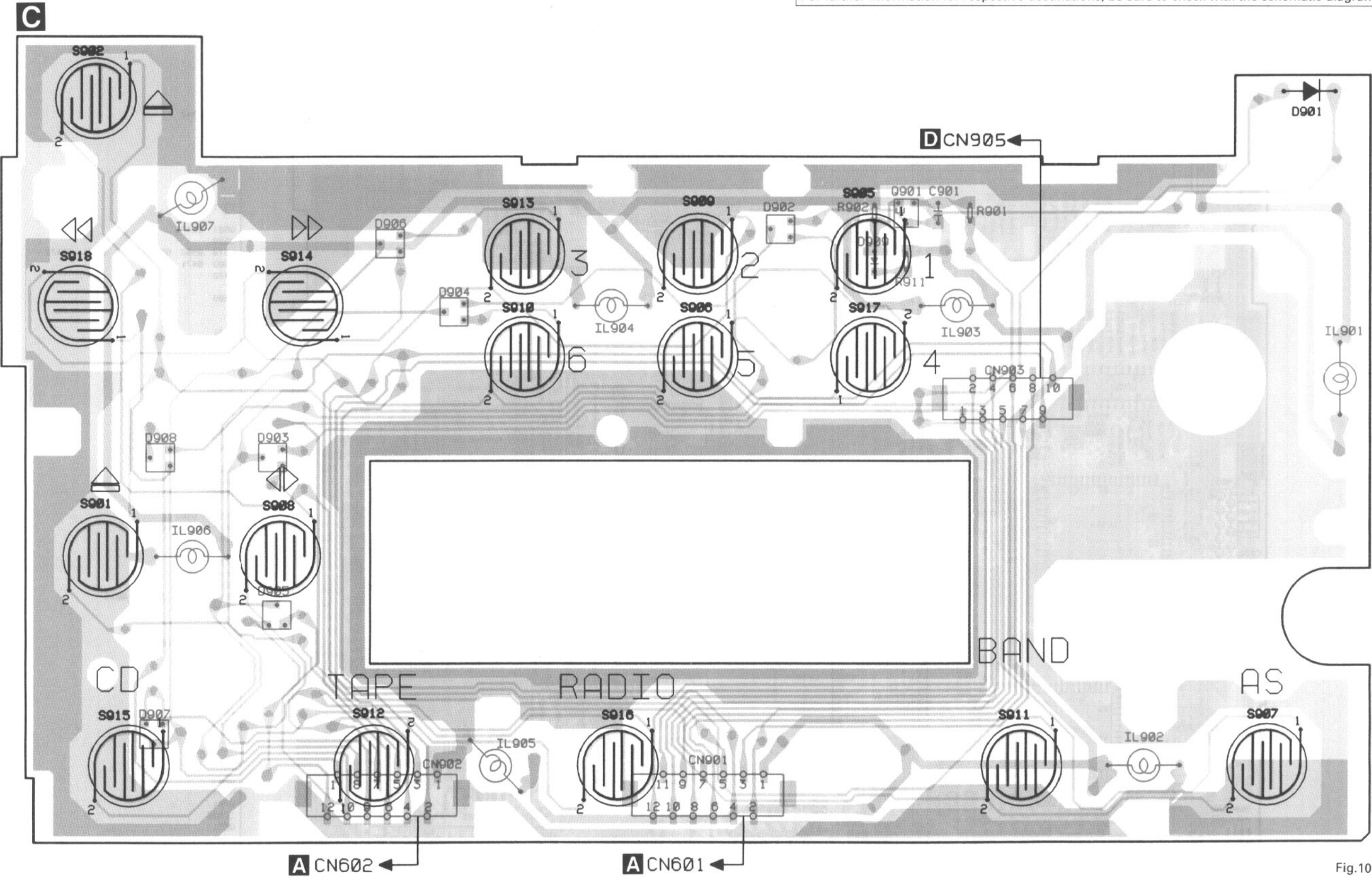
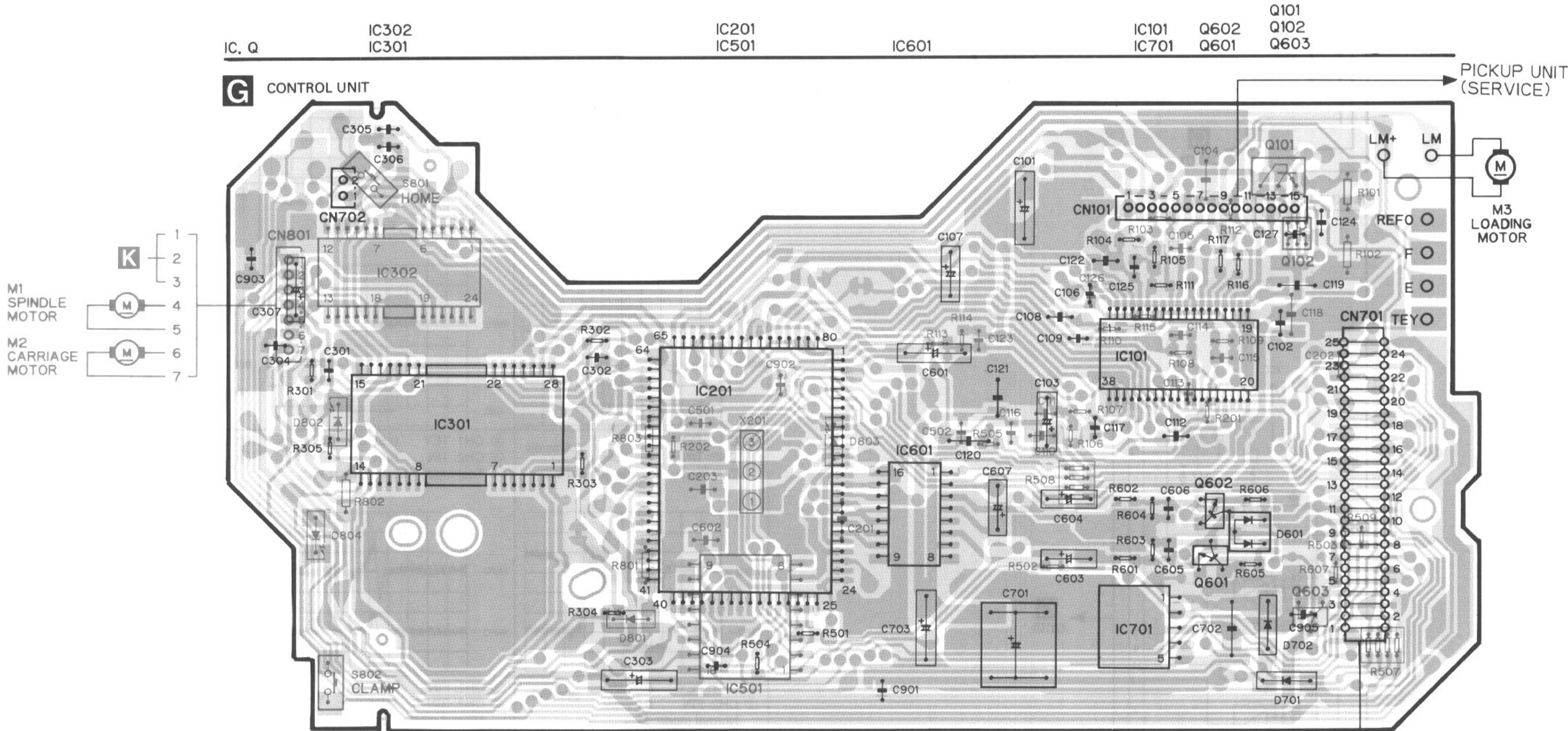


Fig.10

4.3 CD MECHANISM MODULE

● (1/2)



A CN701

Fig.11

NOTE:
The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

● (2/2)

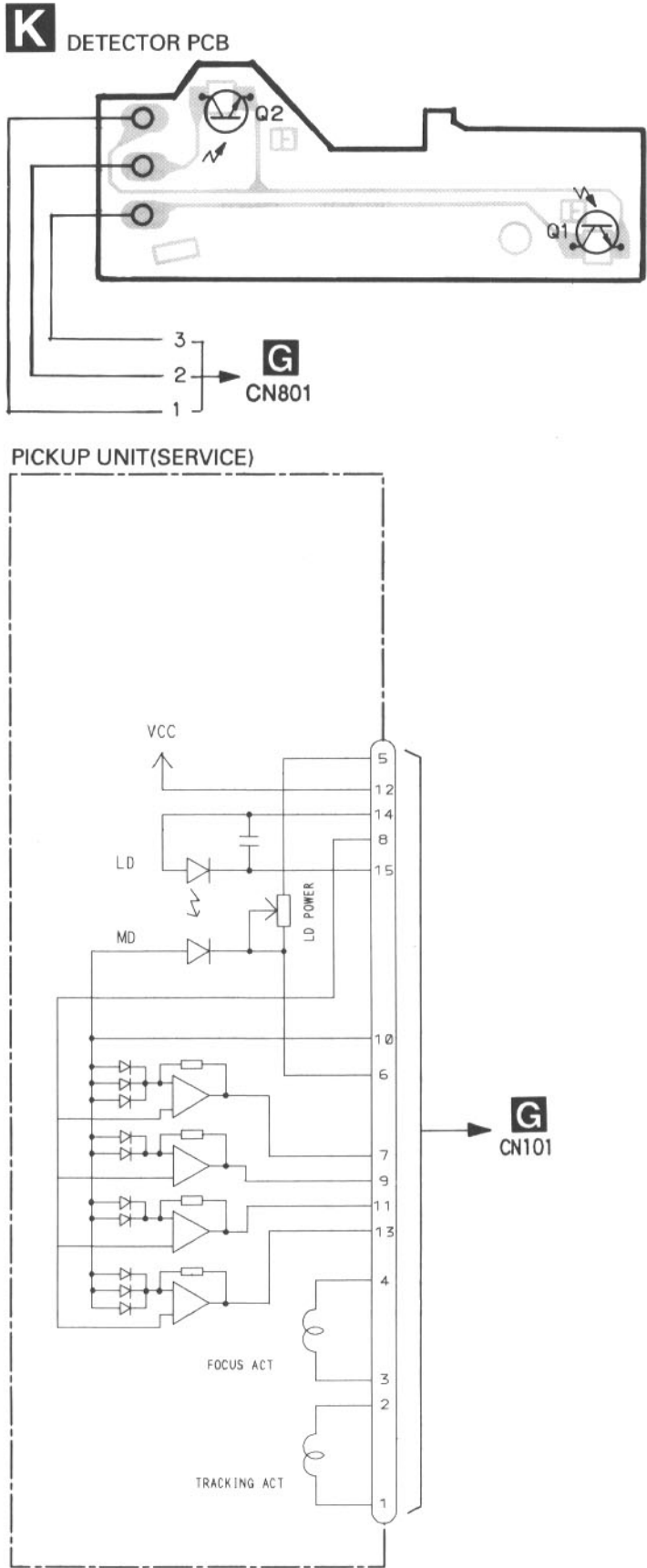
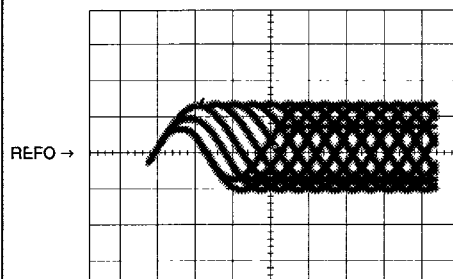


Fig.12

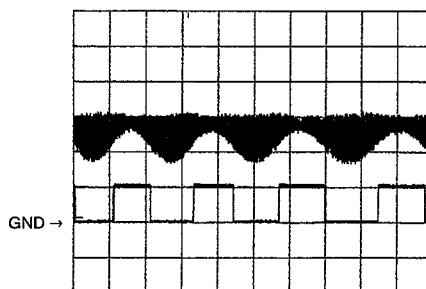
NOTE:
The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

Waveforms

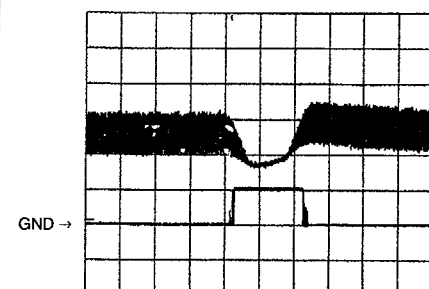
- ① RFO 0.5V/div. 0.5μs/div.
Normal mode: play



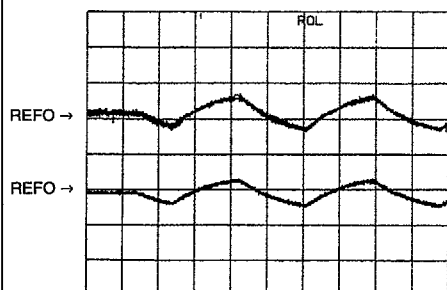
- ① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div. 0.5ms/div.
Test mode: Tracking open



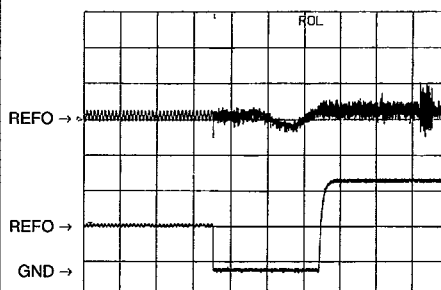
- ① CH1: RFO 1V/div. 0.5ms/div.
② CH2: MIRR 5V/div. 0.5ms/div.
Normal mode: The defect part passes 800μm



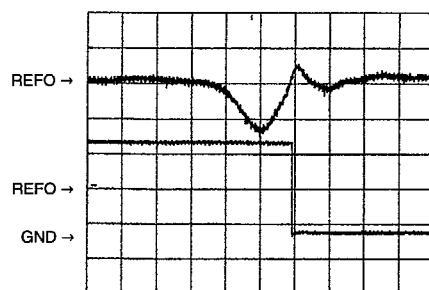
- ③ CH1: FIN 0.5V/div. 0.2s/div.
④ CH2: FO+ 2V/div. 0.2s/div.
Test mode: No disc, Focus close



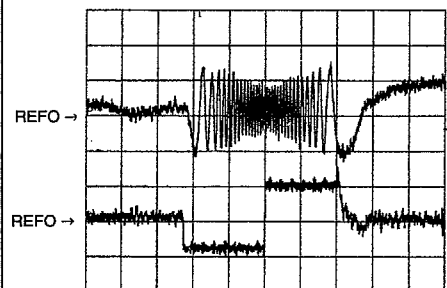
- ③ CH1: FIN 0.5V/div. 0.2s/div.
⑤ CH2: FOK 2V/div. 0.2s/div.
Normal mode: Focus close



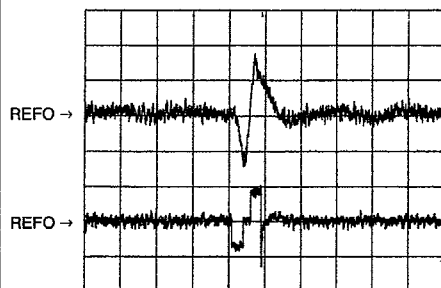
- ⑥ CH1: FEY 0.5V/div. 1ms/div.
⑦ CH2: XSI 2V/div. 1ms/div.
Normal mode: Focus close



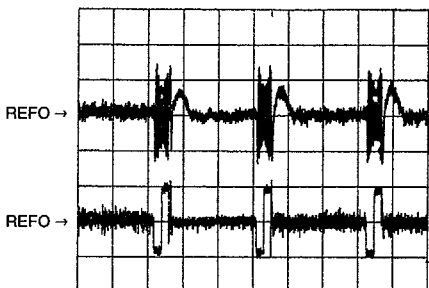
- ⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div. 0.5ms/div.
Test mode: 32 tracks jump (FWD)



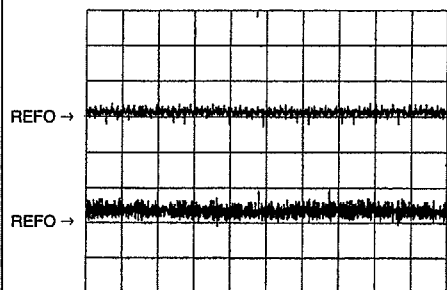
- ⑧ CH1: TEY 0.5V/div. 0.5ms/div.
⑨ CH2: TIN 0.5V/div. 0.5ms/div.
Test mode: Single jump (FWD)



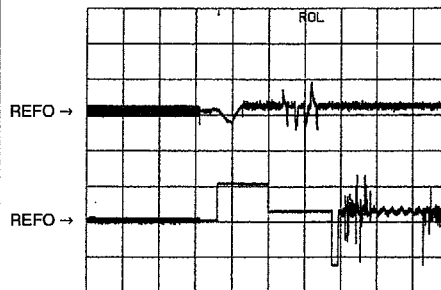
- ⑧ CH1: TEY 0.5V/div. 5ms/div.
⑨ CH2: TIN 0.5V/div. 5ms/div.
Test mode: 100 tracks jump (FWD)



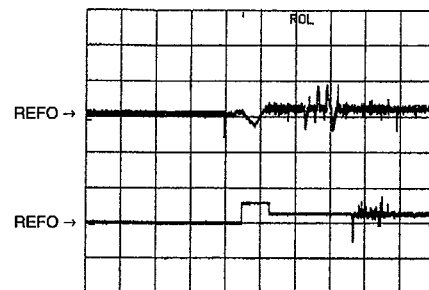
- ⑥ CH1: FEY 0.1V/div. 20ms/div.
③ CH2: FIN 0.2V/div. 20ms/div.
Normal mode: Play

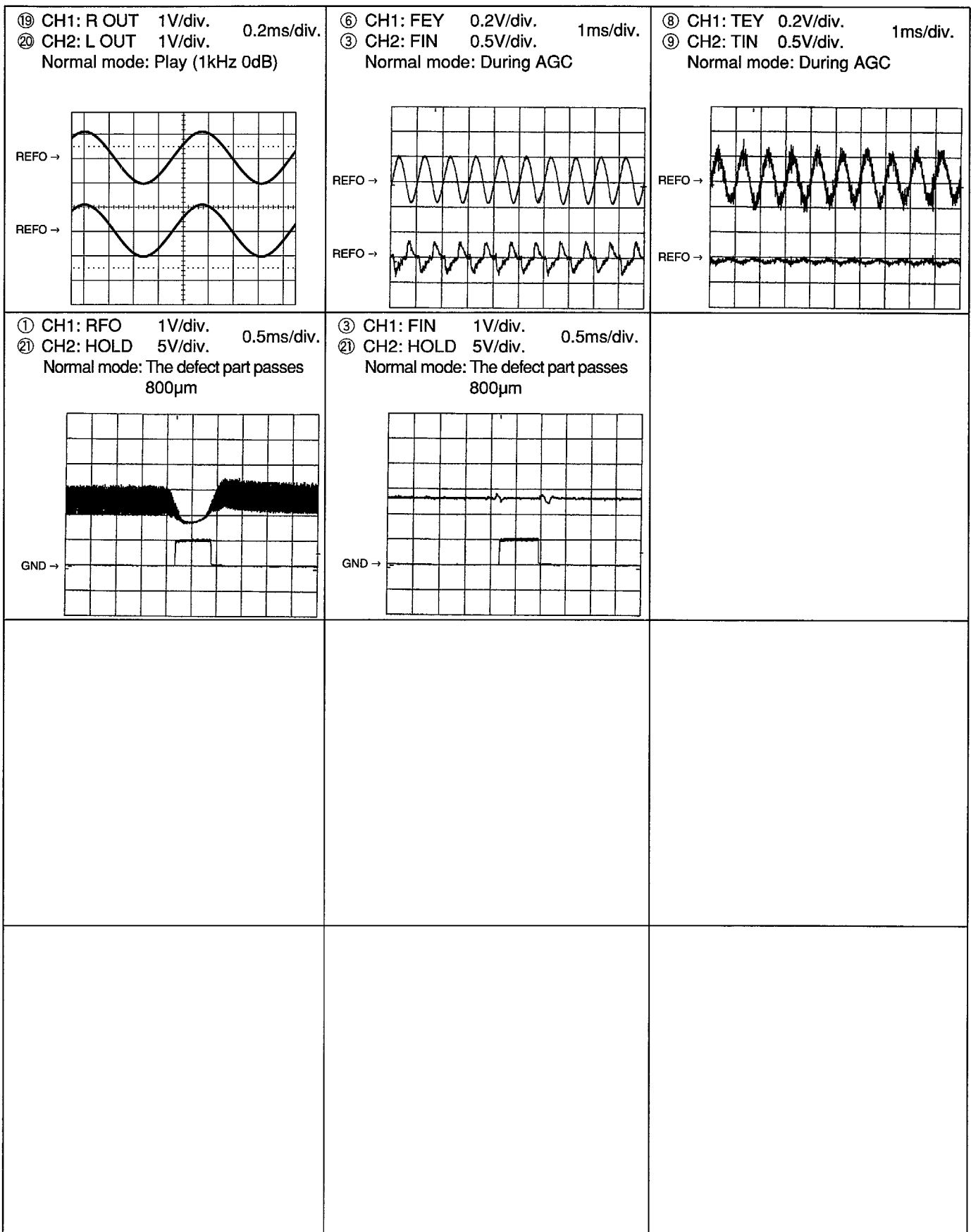
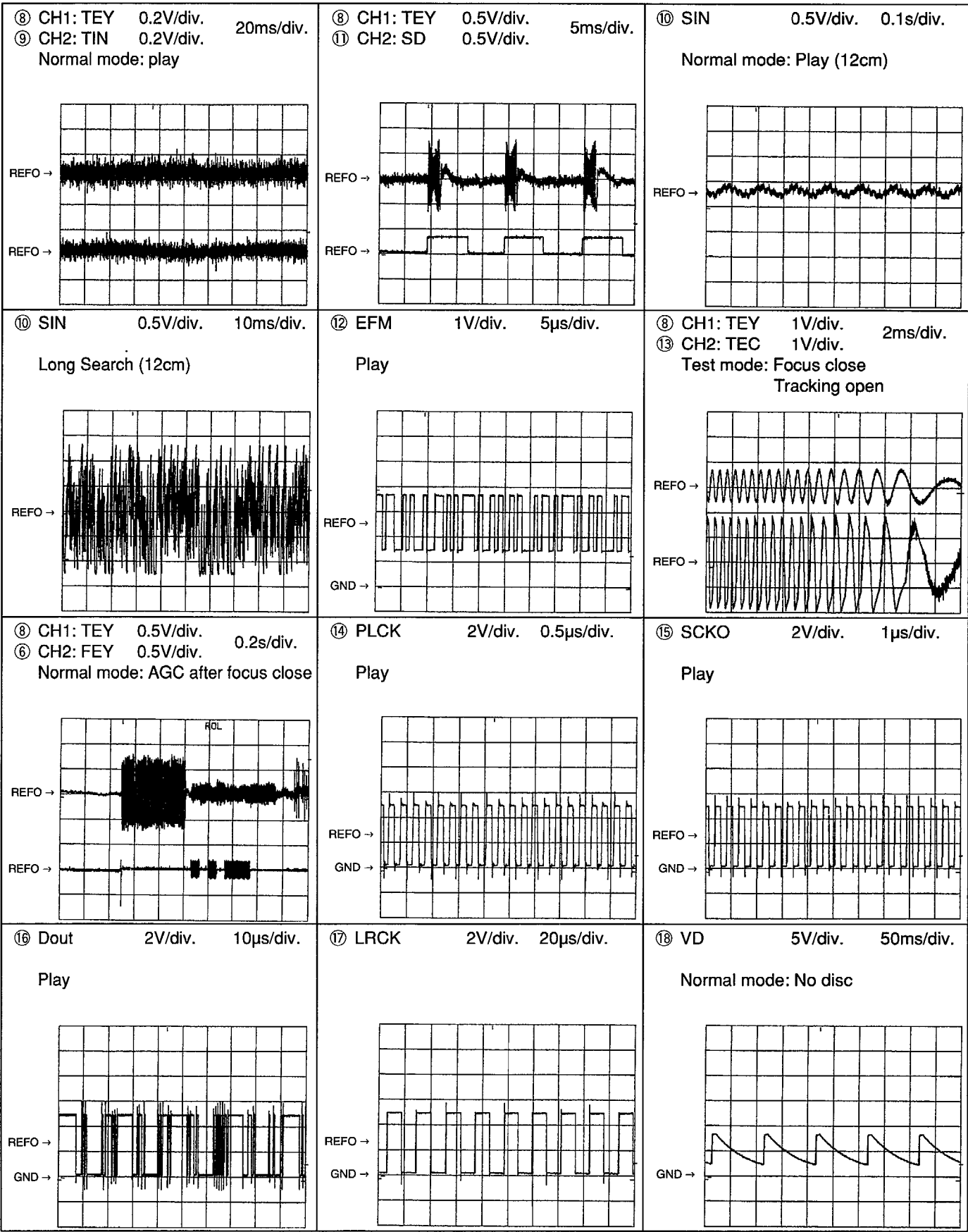


- ③ CH1: FIN 0.5V/div. 0.5s/div.
⑩ CH2: SIN 1V/div. 0.5s/div.
Normal mode: Focus close (12cm)

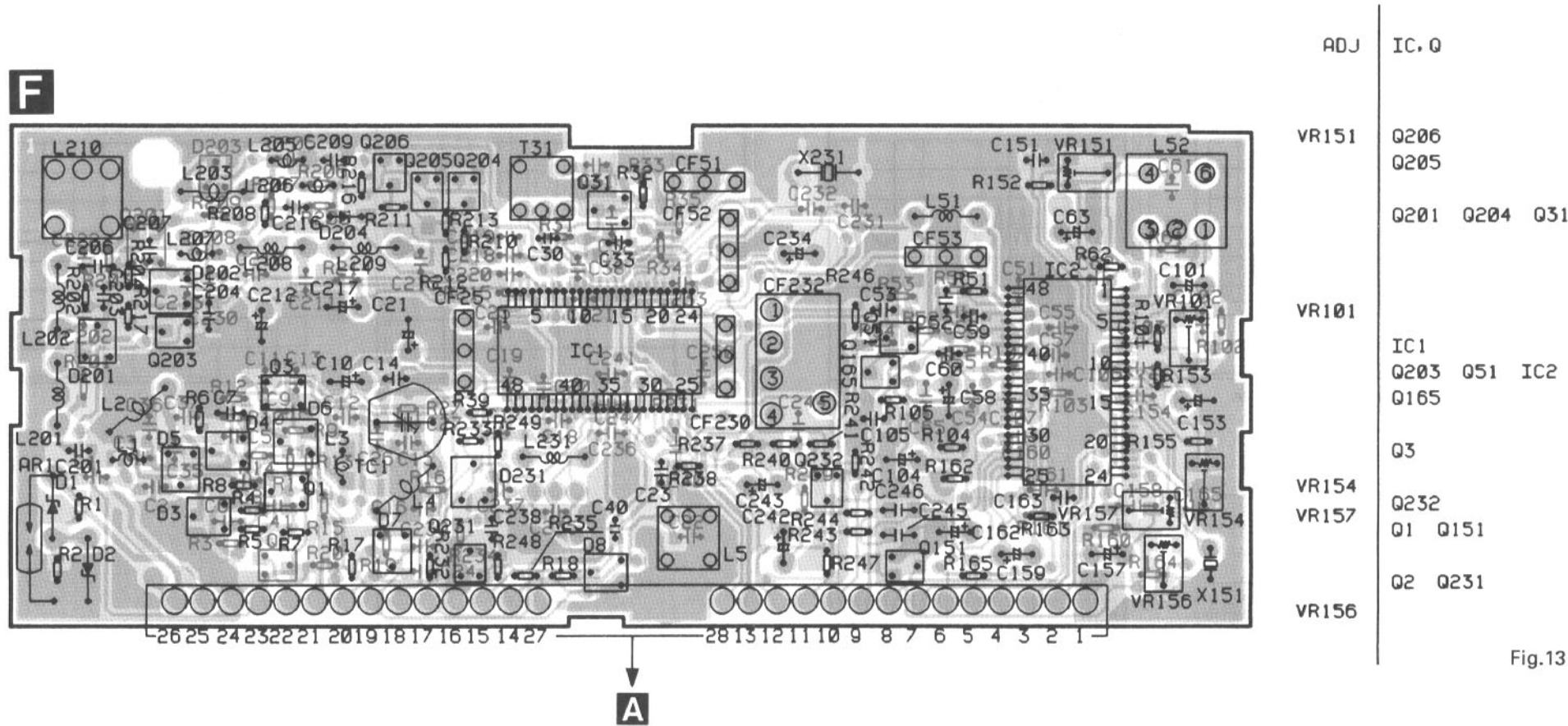


- ③ CH1: FIN 0.5V/div. 0.5s/div.
⑩ CH2: SIN 1V/div. 0.5s/div.
Normal mode: Focus close (8cm)



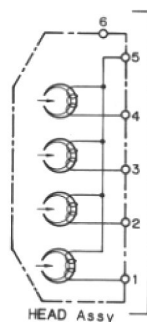


4.4 TUNER UNIT



NOTE:
The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

4.5 CASSETTE MECHANISM MODULE

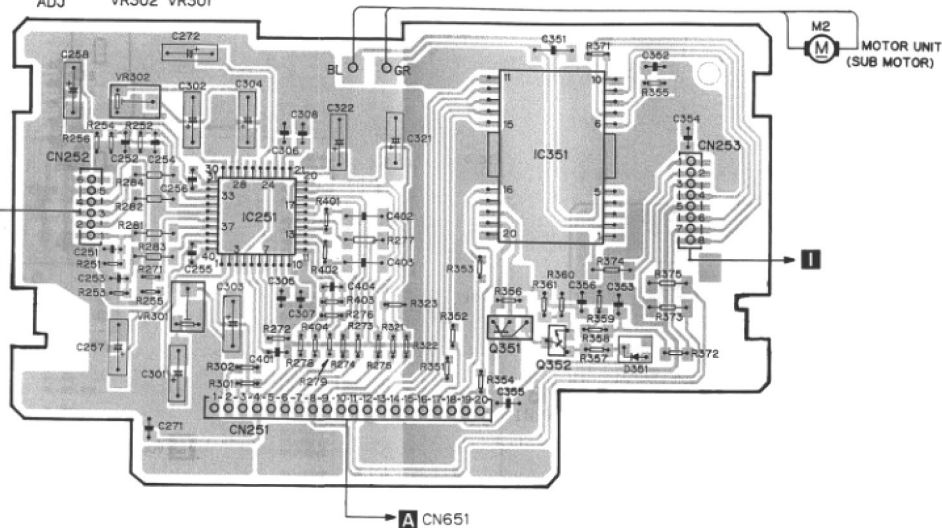
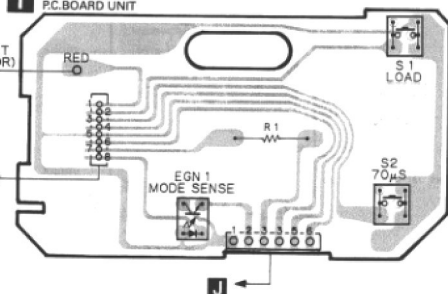
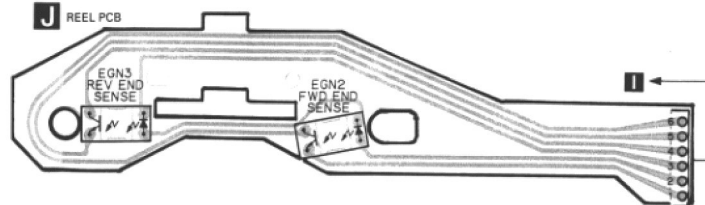
H DECK UNIT

IC, Q

IC251

Q351 IC351 Q352

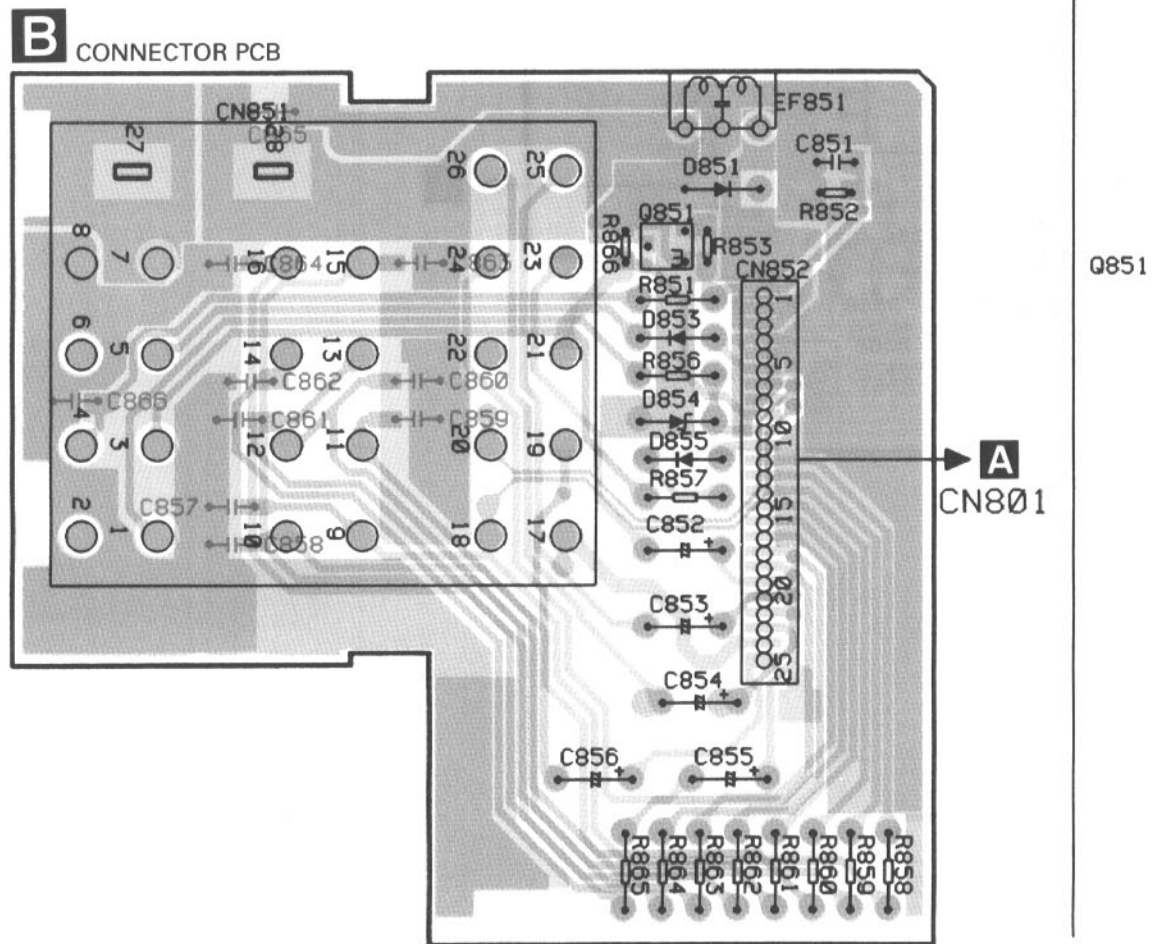
ADJ VR302 VR301

**I** PC BOARD UNITM1
MOTOR UNIT
(MAIN MOTOR)**H** CN253**J** REEL PCB**NOTE:**

The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

Fig.14

4.6 CONNECTOR PCB , VOLUME UNIT



NOTE:
The parts mounted on this PCB include all necessary parts for several destinations.
For further information for respective destinations, be sure to check with the schematic diagram.

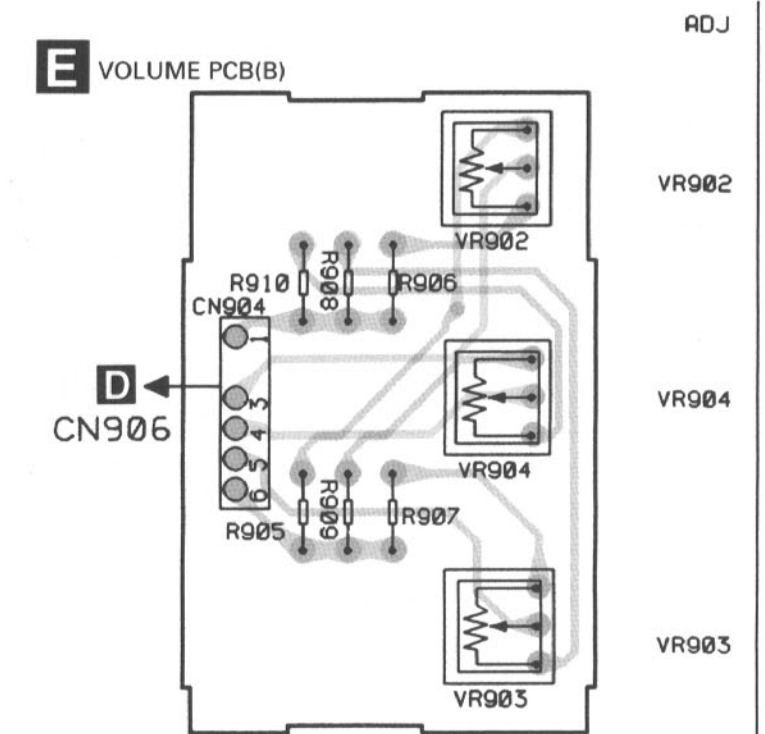
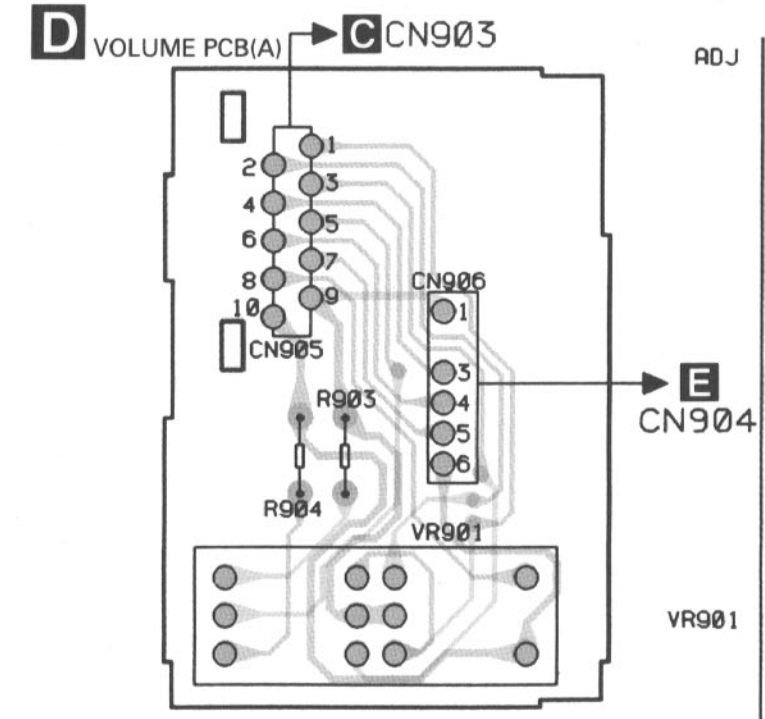


Fig.15

5. ELECTRICAL PARTS LIST

NOTES:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

Chip Resistor

RS1/○S○○○○J, RS1/○○S○○○○J

Chip Capacitor (except for CQS.....)

CKS....., CCS....., CSZS.....

====Circuit Symbol & No. Part Name=====	Part No.	====Circuit Symbol & No. Part Name=====	Part No.
F Unit Number : CWE1422 Unit Name : Tuner Unit		R 19	RS1/16S154J
MISCELLANEOUS		R 27 209 234	RS1/16S0R0J
IC 1	PA4023A	R 31	RS1/16S470J
IC 2	PA4024A	R 32	RS1/16S912J
Q 1 31	2SC2712	R 33	RS1/16S912J
Q 3	3SK263	R 34 35 54	RS1/16S331J
Q 51	2SK1067	R 39 233	RS1/16S0R0J
Q 151	DTC124EU	R 51	RS1/16S331J
Q 201	FC12	R 55	RS1/16S102J
Q 203	DTC124EU	R 56	RS1/16S823J
D 3 202	1SV251	R 61	RS1/16S392J
D 4	1SV250	R 62	RS1/16S273J
D 5 7 8	KV1410-F1	R 103	RS1/16S333J
D 6 201	MA157	R 104	RS1/16S334J
D 231	SVC253	R 105	RS1/16S683J
L 1 Inductor	LCTBR12K2125	R 107 160	RS1/16S222J
L 2 Coil	CTC1145	R 151	RS1/10S102J
L 3 Inductor	LCTB4R7K2125	R 152 217	RS1/16S393J
L 4 Coil	CTC1131	R 155	RS1/16S333J
L 5 Coil	CTC1147	R 161 214	RS1/16S563J
L 51 Ferri-Inductor	LAU150K	R 162	RS1/16S225J
L 52 Coil	CTC1136	R 163	RS1/16S222J
L 201 Ferri-Inductor	LAU4R7K	R 164	RS1/16S104J
L 202 Ferri-Inductor	LAU330K	R 165 208	RS1/16S102J
L 203 Inductor	CTF1371	R 202	RS1/16S223J
L 208 Inductor	LAU390K	R 203	RS1/16S225J
L 209 Ferri-Inductor	LAU680K	R 204	RS1/16S103J
L 210 Coil	CTB1103	R 205	RS1/16S471J
L 231 Inductor	LAU3R3J	R 206	RS1/16S220J
T 31 Coil	CTE1116	R 207	RS1/16S101J
CF 25 51 52 53 Ceramic Filter	CTF1290	R 220	RS1/10S0R0J
CF 230 Cristal Filter	CTF1262	R 231	RS1/16S242J
CF 232 Ceramic Filter	CTF1348	R 237	RS1/16S103J
X 151 Radiator 918.5Hz	CSS1365	R 238	RS1/16S104J
X 231 Crystal Resonator 10.26MHz	CSS1111	R 240	RS1/16S472J
VR 101 Semi-fixed 15kΩ(B)	CCP1230	R 241	RS1/16S202J
VR 154 Semi-fixed 150kΩ(B)	CCP1236	R 243	RS1/16S183J
VR 156 Semi-fixed 68kΩ(B)	CCP1234	R 244	RS1/16S472J
VR 157 Semi-fixed 47kΩ(B)	CCP1233	R 247	RS1/10S153J
RESISTORS		CAPACITORS	
R 3 10	RS1/16S223J	C 1	CCSRCH220J50
R 4 6	RS1/16S101J	C 2 5 13 17 19 20	CKSRYB222K50
R 5	RS1/16S101J	C 3	CCSRCH060D50
R 7	RS1/10S331J	C 6 32 205 236 244	CKSQYB473K16
R 8 17 18 232	RS1/16S473J	C 7 204	CKSQYB473K16
R 9 215	RS1/16S473J	C 8 41 56 65 152 154 160 161 230 241	CKSQYB104K16
R 11	RS1/16S124J	C 9 250	CCSRCH030C50
R 12	RS1/16S474J	C 10	CEA010M50LL
R 15	RS1/16S271J	C 11 54	CCSRCH470J50
R 16 52 53 239	RS1/16S104J	C 12	CCSRCH820J50

====Circuit Symbol & No. Part Name=====	Part No.
C 14	CCSRCH040C50
C 15	CCSRCH070D50
C 16 36	CCSRCH120J50
C 18 24 31 62 107 213 220 221 233 239	CKSRYB103K25
C 21	CEA100M16LL
C 22	CCSRRH100D50
C 23	CCSRRH120J50
C 30	CCSRRH201J50
C 33	CCSRCH020C50
C 35 61	CCSRCH270J50
C 40 53	CKSRYB222K50
C 51 219	CKSRYB223K25
C 52 59 105 201	CKSRYB103K25
C 55	CKSQYB223K25
C 57	CKSRYB472K50
C 58 234	CEA330M10LL
C 60 163	CKSRYB102K50
C 63	CEAR22M50LL
C 101	CEA100M10NPLL
C 102	CKSRYB182K50
C 103	CKSQYB682K50
C 104	CEA2R2M50LL
C 106	CCSRCH151J50
C 151	CKSRYB392K50
C 153 157 162	CEA3R3M50LL
C 158	CKSYB474K16
C 159	CEA220M6R3LL
C 165 202	CCSRCH100D50
C 203	CKSRYB332K50
C 206	CKSQYB103K25
C 207	CCSRCH120J50
C 211	CCSRCH560J50
C 212	CEA101M10LL
C 215	CCSRCH680J50
C 216	CCSRCH101J50
C 217 242	CEAR47M50LL
C 231	CCSRCH330J50
C 232	CCSRCH150J50
C 235	CKSRYB332K50
C 237	CCSRTH180J50
C 240	CKSYB104K16
C 243	CEAR33M50LL
C 245	CKSQYB223K25
C 246	CKSQYB224K16

 Unit Number : CWM4355
Unit Name : Key Board Unit

MISCELLANEOUS

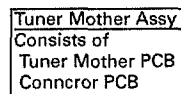
Q 901	2SC2712
D 901	AA2222S
D 902 903 904 905 906 907 908	MA151WK
IL 901 902 903	CEL1449
IL 904 905 906 907	CEL1449

RESISTORS

R 901	RS1/10S102J
R 902	RS1/10S821J

CAPACITORS

C 901	CKSQYB103K50
-------	--------------

====Circuit Symbol & No. Part Name=====	Part No.
	

 Unit Number : CWM4382
Unit Name : Tuner Mother Assy

MISCELLANEOUS

IC 401 402 403 404 471 472	NJM4558MD
IC 405	SN761025DL
IC 501	LC72146M
IC 601	PD4631A
IC 602	S-29220A
IC 651	UPD72005GC(A)
IC 652	GGC1191
IC 701	PCA82C250T
IC 801	PD4663A
IC 802	S-80735ANDZ1
	S-80763ANJT
IC 803	S-81250PGPD
Q 471 508 807	DTC114EK
Q 472	DTC144EK
Q 473	IMH2A
Q 501	DTC144EK
Q 502 503 504	2SB1132
Q 506	2SK208
Q 507 651 812 813 851	2SC2712
Q 509	DTA114TK
Q 510	2SB1238
Q 511	2SC2712
Q 652 811	2SA1162
Q 701	DTA144EK
Q 801 804 808 816 819	IMX1
Q 802 815 818	2SB1185
Q 803 810 817	DTC114TK
Q 805 809	2SB1260
Q 806	2SA1162
Q 814	2SB1243
D 401 402 403 404 405 406 407 408	RD10ES(B2)
D 409 410 501	MA151WK
D 471	RD4R7JS(B3)
D 502 503 802 804 806 855	1SS133
D 504	RD2R7M(B2)
D 601	IMN10
D 651 653	RD4R7ES(B3)
D 652 654 803 805 854	RD16ES(B3)
D 655	RD13ES(B2)
D 656	MA151WA
D 801	RD8R2JS(B1)
D 807 809 851	ERA15-02VH
D 808	RD7R5JS(B3)
D 853	ERA15-10VH
L 501 504 506 601	LAU4R7K
L 602 701	LAU4R7K
L 502 503	Resistor
L 507	Inductor
L 508	Inductor
L 509	Coil
L 510	Inductor
L 511	Coil
L 512	Resistor
L 651	Ferri-Inductor
L 652	Ferri-Inductor
L 653	Choke Coil
	RD1/4PU0R0J
	CTF1053
	CTF1374
	CTE1123
	LCTBR27K2125
	LCTBR22K2125
	RD1/4PU0R0J
	LAU220K
	LAU220K
	CTH1180

====Circuit Symbol & No. Part Name=====	Part No.	====Circuit Symbol & No. Part Name=====	Part No.
L 801	Choke Coil	CTH1074	
TH 701	Thermistor	CCX1015	
X 501	Crystal 7.2MHz	CSS1030	
X 601	Ceramic Oscillator 4.194MHz	CSS1071	
X 651	Oscillator 2.00MHz	CSS1393	
X 701	Oscillator 8.380MHz	CSS1354	
FU 851	Fuse 5A	CEK1005	
	Tuner Unit	CWE1422	
EF 851	EM Filter	CCG1006	
AR 501	Arrester	DSP-201M	
RESISTORS			
R 403 404		RS1/10S222J	
R 405 406		RS1/10S162J	
R 409 410 411 412 413 414 502 525 526 527		RS1/10S102J	
R 415 416		RS1/10S273J	
R 417 418		RS1/10S101J	
R 419 420		RS1/10S361J	
R 421 422 423 424		RS1/10S562J	
R 425 426 427 428 429 430 431 432 437 438		RS1/10S472J	
R 433 434 435 436 441 442 443 444		RS1/10S470J	
R 439 440 478 479 489 490 510 511 516 524		RS1/10S472J	
R 471 501 529 672 673 804 824 833		RS1/10S103J	
R 472		RS1/10S133J	
R 473		RS1/10S103J	
R 474		RS1/10S682J	
R 475 802 803 830		RS1/10S471J	
R 476 477		RS1/10S153J	
R 480		RS1/10S473J	
R 481 482 487 488		RS1/10S123J	
R 483 484 485 486 517 530 806 815 821 822		RS1/10S223J	
R 503 651 652 664 667 723 827		RS1/10S681J	
R 504		RS1/10S393J	
R 505 506 521 522 604 605 618 622 623 625		RS1/10S222J	
R 507 508 509 519 606 607 608 615 616 620		RS1/10S473J	
R 512		RS1/10S392J	
R 513		RS1/10S223J	
R 514		RA4C103J	
R 515 614 659		RA4C102J	
R 520 528		RS1/10S562J	
R 523 670 801 828 838		RS1/10S152J	
R 531		RD1/4PU180J	
R 532		RS1/10S0R0J	
R 533		RS1/10S510J	
R 534		RS1/10S0R0J	
R 535		RS1/10S0R0J	
R 536		RS1/10S472J	
R 537		RD1/4PU100J	
R 538		RS1/10S103J	
R 601		RS1/10S272J	
R 602		RS1/10S682J	
R 603 619 716 811 834		RS1/10S472J	
R 609		RA3C222J	
R 610		RS1/10S184J	
R 611 612 660 661 702 721		RA3C102J	
R 613 653 655 722		RA4C681J	
R 617 630		RA3C472J	
R 621 627 668 709 712 717 718 724 725 726		RS1/10S473J	
R 626 628 669 706 707 708 711 713 814 829		RS1/10S222J	
R 629		RA4C222J	
R 631		RA3C223J	
R 654 656		RA4C473J	
R 657		RA4C472J	
R 658		RA4C223J	
R 662 663 701		RA3C473J	
R 671		RS1/10S822J	
R 674		RS1/10S270J	
R 703 705 719 720 813 816		RS1/10S102J	
R 704		RA3C102J	
R 710		RS1/10S105J	
R 714		RS1/10S122J	
R 715		RS1/10S303J	
R 727		RS1/10S102J	
R 805 831		RS1/10S331J	
R 807		RD1/4PU223J	
R 808		RD1/4PU472J	
R 809		RD1/4PU223J	
R 810		RS1/10S222J	
R 812		RS1/10S822J	
R 817		RS1/10S473J	
R 818		RS1/10S222J	
R 819		RS1/10S103J	
R 820		RS1/10S102J	
R 823 825 832 835		RS1/10S223J	
R 826		RS1/10S122J	
R 836		RS1/10S681J	
R 837		RS1/10S242J	
R 839		RS1/10S153J	
R 840		RD1/4PU100J	
R 851		RD1/4PU112J	
R 852		RS1/10S121J	
R 853		RS1/10S103J	
R 856		RD1/4PU221J	
R 857		RD1/4PU222J	
R 858 859 860 861 862 863 864 865		RD1/4PU470J	
CAPACITORS			
C 401 402		RD1/4PU102J	
C 403 404 405 406 407 408 657 856		CEA4R7M35LS	
C 409 410 471 663		CEA2R2M50LS2	
C 411 412 415 416 431 432		CEALNP100M10	
C 413 414		CKSQYB272K50	
C 417 418		CEA4R7M25LS2	
C 419 420		CKSQYB392K50	
C 421 422		CKSQYB222K50	
C 423 424		CKSQYB152K50	
C 425 426		CEALNP1R5M50	
C 427 428 437 438 439 440 441 442 443 444		CCSQCH101J50	
C 429 430		CKSQYB184K16	
C 433 434 435 436 473 519 606 703 810 852		CEA100M16LS2	
C 445 446 447 448 449 450 451 452 478 501		CKSQYB102K50	
C 453 454 455 456 457 458 459 460		CEAS100M50	
C 461 462		CKSQYB334K16	
C 472		CKSQYB153K25	
C 474 477 503 524 528 529 530 533 601 602		CKSQYB103K50	
C 475		CEA101M10LS	
C 476 483 484 808		CEA330M10LS	
C 479		CEALNP4R7M16	
C 480 522 668 669		CCSQCH101J50	
C 481 482		CCSQCH470J50	
C 502		CKSQYB223K25	
C 504		CKSQYB102K50	
C 505 508 509 511 513 517 518 526 611 622		CKSQYB223K25	
C 507		CKSQYB104K16	
C 510 514 623		CKSQYB471K50	
C 512 609 610 653 654 655 656 701 813		CKSQYB102K50	
C 515 516		CKSQYB333K25	
C 520 521 673 674		CCSQCH270J50	
C 525		CCH1280	
C 527		CFTNA104J50	
C 531 532		CCSQCH100D50	
C 603 604 607 612 613 614 615 616 617 618		CKSQYB103K50	

====Circuit Symbol & No. Part Name=====	Part No.
C 605 0.047F/5.5V	CCL1040
C 608	CKSYB223K25
C 619 620 621 624 651 658 659 660 661 662	CKSQYB103K50
C 652	CASAQ4R7M10
C 664 665 666 704 814 817 819	CKSQYB103K50
C 667	CKSQYB223K25
C 671	CEAS331M6R3
C 672 702 803 805 809 811 812 851	CKSQYB223K25
C 801 815 818	CEAS101M10
C 802 816	CKSQYB472K50
C 804	CEAS471M25
C 806	CEA330M25LS
C 807	CEA4R7M35LS
C 853 854 855	CEA100M16LS2

Volume Unit
Consists of
Volume PCB(A)
Volume PCB(B)

DE Unit Number : CWM4511
Unit Name : Volume Unit

MISCELLANEOUS

VR 901	Volume 50kΩ(B)	CSD1031
VR 902 903 904	Volume 50kΩ(B)	CCS1089

RESISTORS

R 903 904 905 906 907 908 909 910	RD1/4PU182J
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G Unit Number : CWX2096
Unit Name : Control Unit

MISCELLANEOUS

IC 101	UPC2572GS
IC 201	UPD63702GF
IC 301	XLA6997FP
IC 302	XLA6285FP
IC 601	TA2063F
IC 701	PQ05TZ51
Q 101	2SD1664
Q 102	UMD2N
Q 601 602	2SD1781K
Q 603	2SB709A
D 601	MA151WA
D 701 702	1SR154-400
D 801 802	CL200IRX
X 201	CSS1363
S 801 802	CSN1028
	LED
	Ceramic Resonator 16.93MHz
	Switch(Home, Clamp)

RESISTORS

R 101	RS1/8S100J
R 102	RS1/8S120J
R 103	RS1/16S102J
R 104	RS1/16S822J
R 105	RS1/16S682J
R 106	RS1/16S183J
R 107	RS1/16S822J
R 108	RS1/16S333J
R 109	RS1/16S683J
R 110	RS1/16S134J
R 111	RS1/16S273J
R 112	RS1/16S222J
R 113 114 607	RS1/16S103J
R 115	RS1/16S102J
R 116 117	RS1/16S163J

====Circuit Symbol & No. Part Name=====	Part No.
R 201	RS1/16S104J
R 202	RS1/16S473J
R 304 501	RS1/16S0R0J
R 505	RS1/16S102J
R 507	RA4C102J
R 508	RA4C681J
R 601 602	RS1/16S102J
R 603 604	RS1/16S223J
R 605 606	RS1/16S162J
R 801 802	RS1/8S751J

CAPACITORS

C 101 601 703	CEV101M6R3
C 102	CKSQYB104K16
C 103	CEV470M6R3
C 104	CKSYB334K16
C 105	CCSRCH330J50
C 106 304	CKSRYB103K25
C 107 603 604	CEV4R7M35
C 108	CKSQYB273K50
C 109	CCSRCH101J50
C 110 202	CKSQYB104K16
C 111	CKSRYB332K50
C 112	CKSQYB473K16
C 113	CKSRYB103K25
C 114	CKSRYB391K50
C 115	CCSRCH121J50
C 116	CKSRYB682K25
C 117	CKSRYB333K16
C 118 201	CKSYB334K16
C 119	CKSYB334K16
C 120 121 702	CKSYB334K16
C 122 124	CKSQYB104K16
C 123	CKSRYB472K50
C 125	CCSRCH060D50
C 126	CKSRYB153K25
C 127	CCSRCH102J25
C 203	CKSQYB104K16
C 303	CEV470M16
C 305 306	CKSRYB103K25
C 307	CEV100M25
C 502	CKSRYB471K50
C 602	CKSQYB104K16
C 605 606	CKSRYB152K50
C 607	CEV220M6R3
C 701	CCH1233
C 901 903	CCSRCH471J50
C 902	CCSRCH271J50
C 904	CCSRCH101J50

H Unit Number : CWM4527
Unit Name : Deck Unit

MISCELLANEOUS

IC 251	CXA1910Q
IC 351	PA2020A
Q 351	2SB1260
Q 352	2SC4102
D 351	MA141K

VR 301 302	Semi-fixed 22kΩ(B)	CCP1129
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====Circuit Symbol & No. Part Name==== Part No.

RESISTORS

R 255 256	RS1/16S181J
R 271	RS1/16S183J
R 272	RS1/16S183J
R 273 274 275 276 322 351 352 353 354	RS1/16S102J
R 277 281 282 283 284 373 374 375	RS1/8S0R0J
R 278 301 302 371 404	RS1/16S0R0J
R 323	RS1/16S102J
R 355	RS1/10S274J
R 356	RS1/10S202J
R 357	RS1/10S472J
R 358 359	RS1/10S103J
R 360	RS1/10S102J
R 361	RS1/10S622J
R 372	RS1/10S0R0J
R 401	RS1/16S821J
R 402	RS1/16S392J
R 403	RS1/16S105J

CAPACITORS

C 251 252 253 254	CKSRYB391K50
C 255 256	CKSRYB103K50
C 257 258	CEV470M6R3
C 271 307 308	CKSQYB104K16
C 272 301 302	CEV100M16
C 303 304	CEV010M50
C 351	CKSYB224K25
C 352	CKSQYB392K50
C 353 356	CKSQYB103K50
C 354	CKSQYB473K50
C 355	CKSYB104K50
C 401	CCSRCH151J50
C 402	CKSYB684K16
C 403	CKSYB333K25
C 404	CKSRYB333K16

I Unit Number :
Unit Name : P.C.Board Unit

S 1 2	Switch (70μS,Load)	ESG1004
EGN 1	Photo-Interrupter	EGN1005
R 1		RD1/4HM181J

J Unit Number :
Unit Name : Reel PCB

EGN 2 3	Photo-Reflector	EGN1004
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K Unit Number :
Unit Name : Detector PCB

Q 1 2	Photo Transistor	CPT-230S-X
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Miscellaneous Parts List

M 1	Pickup Unit(Service)	CXX1230
M 2	Motor Unit(Spindle)	CXA8912
M 3	CRG Motor Unit(Carriage)	CXA8986
M 1	Load Motor Unit>Loading)	CXA8702
M 1	Motor Unit(Main)	EXA1381
M 2	Motor Unit(Sub)	EXA1382
HD 1	Head Assy	EXA1488

6. ADJUSTMENT

6.1 CHECKING THE GRATING

● Checking the Grating After Changing the Pickup Unit(Service)

· **Note :**

Unlike previous CD mechanism modules the grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

· **Purpose :**

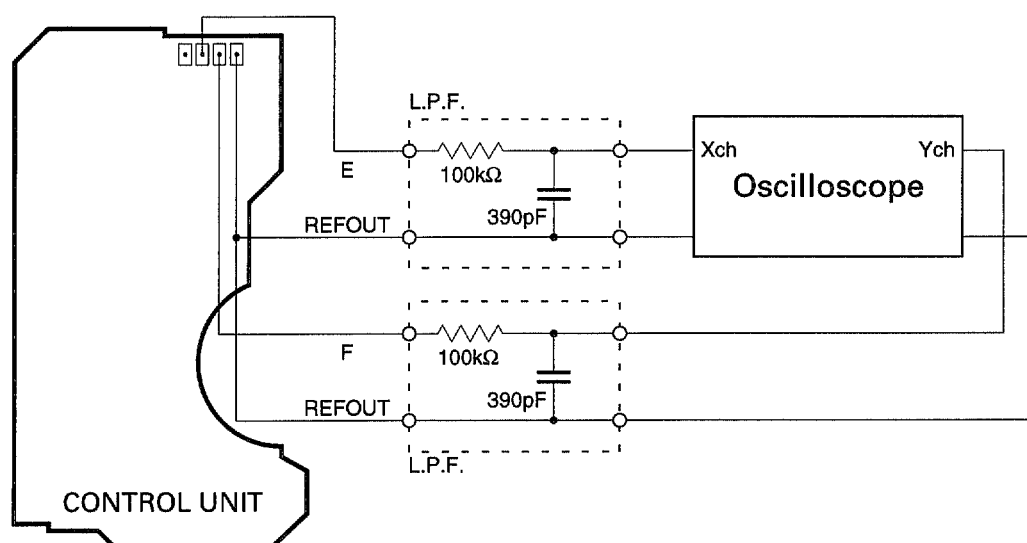
To check that the grating is within an acceptable range.

· **Symptoms of Mal-adjustment :**

If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or track searching taking a long time, may appear.

· **Method :**

- | | |
|-----------------------|----------------------------|
| · Measuring Equipment | · Oscilloscope, Two L.P.F. |
| · Measuring Points | · E, F, REFOUT |
| · Disc | · ABEX TCD-784 |
| · Mode | · TEST MODE |



· **Checking Procedure**

1. In test mode, load the disc and switch the 5V regulator on.
2. Using the **UP** and **DOWN** buttons, move the PU unit to the innermost track.
3. Press key **5** to close focus, the display should read "91". Press key **2** to implement the tracking balance adjustment the display should now read "81". Press key **5** 4 times. The display will change, returning to "81" on the fourth press.
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75°. Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75° try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75° then the mechanism should be judged to be at fault.

· **Note**

Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.

· **Hint**

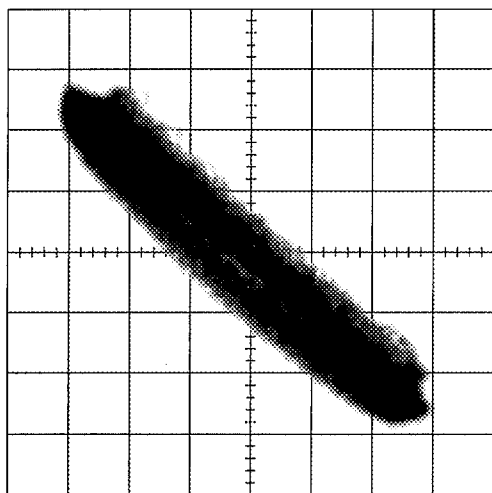
Reloading the disc changes the clamp position and may decrease the "wobble".

Grating waveform

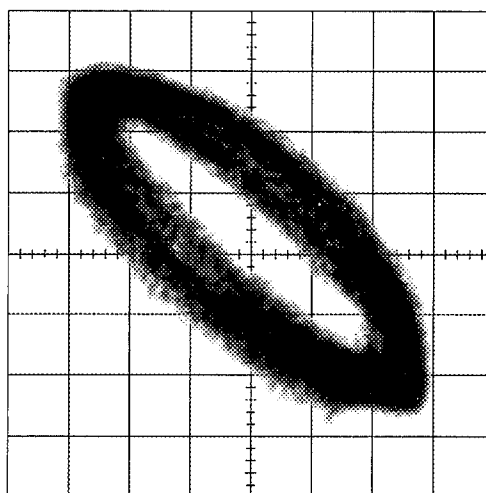
Ech → Xch 20mV/div, AC

Fch → Ych 20mV/div, AC

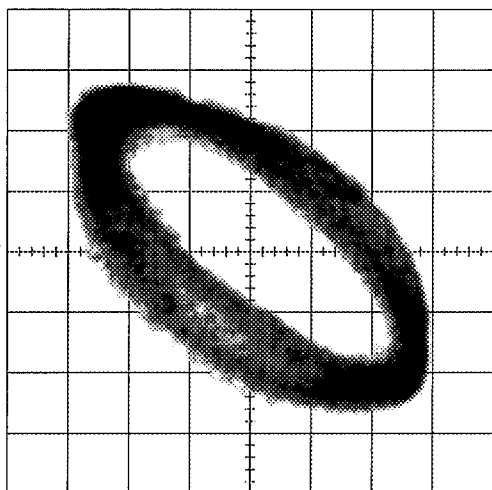
0°



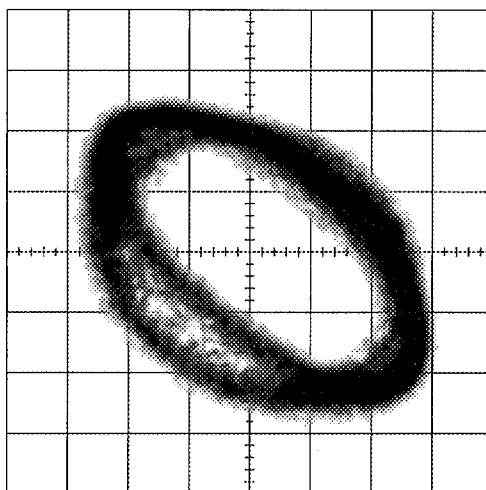
30°



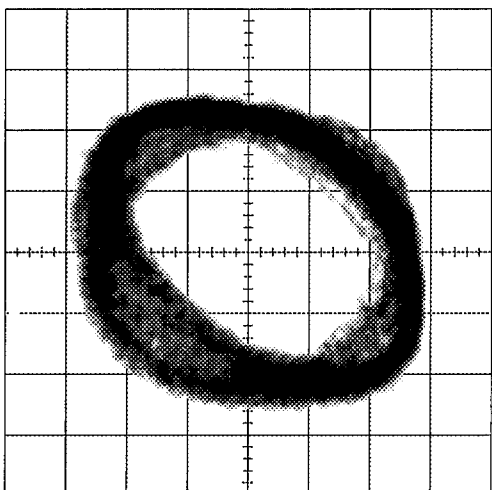
45°



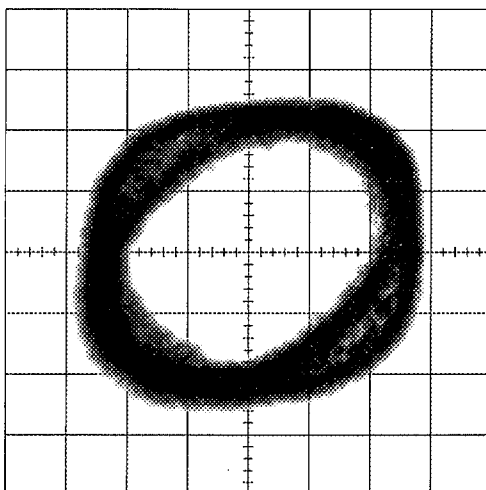
60°



75°



90°



6.2 TUNER/AUDIO ADJUSTMENT

● Connection Diagram

NOTE:

Select C1 so that total capacity of 80pF is attained from the direction of the receiver jack.

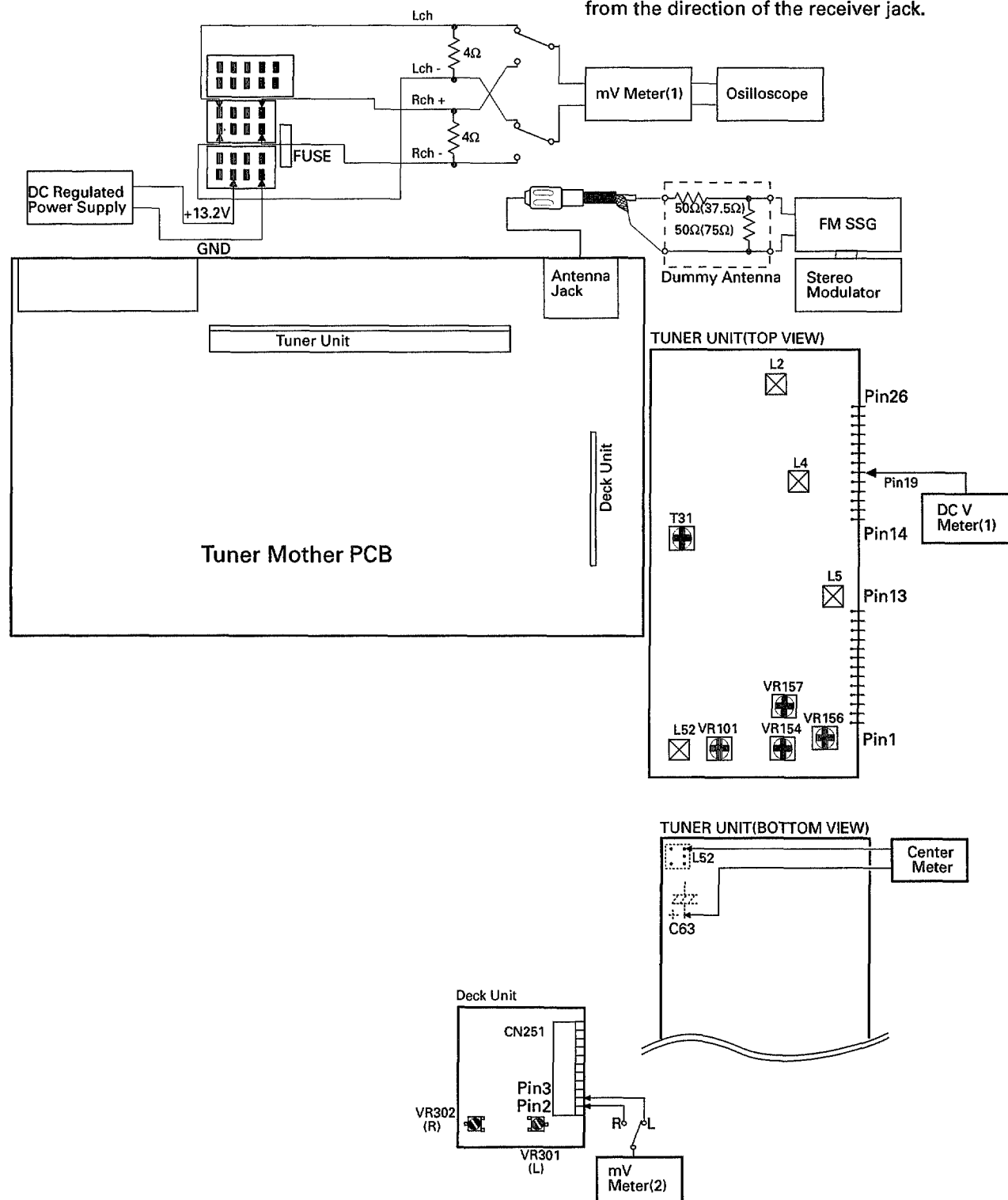


Fig.16

FM ADJUSTMENT

NOTE: Before proceeding to further adjustments after switching power ON, let the tuner run for ten minutes to allow the circuits to stabilize.

Modulation M : MONO MOD., 400Hz, 30%(22.5kHz Dev.)

S : STEREO MOD., 1kHz, L or R=30%(20.25+7.5kHz Dev.)

	No.	FM SSG		Displayed	Adjustment Point	Adjustment Method (Switch Position)
		Frequency(MHz)	Level(dBf)	Frequency(MHz)		
TUN Volt	1	108.0	—	108.0	L5	DC V Meter(1) : 6.5V
Center	1	98.1 M	65	98.1	L52	Center Meter : 0
ANT	1	89.9 M	5	89.9	L2	mV Meter(1) : Maximum
RF	1	89.9 M	5	89.9	L4	mV Meter(1) : Maximum
IFT	1	98.1 M	5	98.1	T31	mV Meter(1) : Maximum
Sepa- ration	1	98.1 S	15	98.1	VR101	mV Meter(1) : Separation Maximum
ARC	1	98.1 S	40	98.1	VR154	mV Meter(1) : Separation5dB
Soft Mute	1	98.1 M	65	98.1	VR157	mV Meter(1) : -3dBs
Search	1	98.1 M	25	98.1	VR156	DC V Meter(1) : Approx.4V (STEREO MODE)

DOLBY NR ADJUSTMENT

No.	Test Tape	Adjustment Point	Adjustment Method (Switch Position)
1	NCT-150 (400Hz, 200nwb/m)	VR301(Lch), VR302(Rch)	mV Meter(2) : -6.0dBs±1.0dB (DOLBY NR switch : OFF)

7. GENERAL INFORMATION

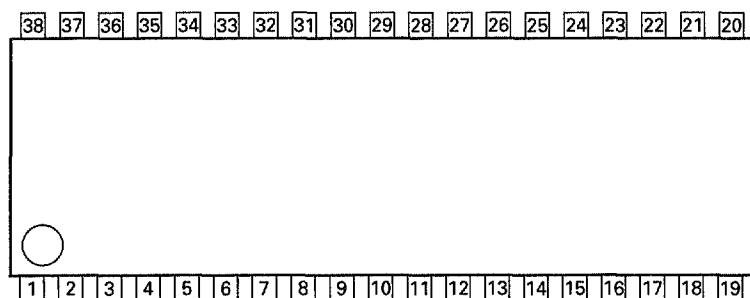
7.1 PARTS

7.1.1 IC

● Pin Functions (UPC2572GS)

Pin No.	Pin Name	I/O	Function and Operation
1	EFM-IN	I	EFM comparator input
2	RFO	O	AGC amplifier output
3	C. AGC		Connects AGC peak detection condenser
4	RF-IN	I	RF signal DC component cut input
5	RF-OUT	O	RF amplifier output
6	RF-	I	RF amplifier inverted input
7	C1, 3T		Connects RF3T component detection condenser
8	C2, 3T		Connects RF3T component detection condenser
9	Vcc		Power supply
10	A	I	A signal input
11	C	I	C signal input
12	B	I	B signal input
13	D	I	D signal input
14	F	I	F signal input
15	E	I	E signal input
16	PD	I	APC amplifier input
17	LD	O	APC amplifier output
18	LDON	I	Laser diode ON/OFF input
19	VREF-OUT	O	Reference voltage output
20	VREF-IN	I	Reference voltage input
21	DET-OUT	O	Vibration detection circuit output
22	DET-IN	I	Vibration detection circuit input
23	TE-OUT2	O	Tracking error amplifier output (fourfold gain)
24	TE-OUT1	O	Tracking error amplifier output (single fold gain)
25	TE-	I	Tracking error amplifier inverted input
26	GND		GND
27	FE-	I	Focus error amplifier inverted input
28	FE-OUT	O	Focus error amplifier output
29	C.FE	I	Focus error signal DC component cut input
30	3T-OUT	O	RF3T component output
31	MIRR	O	MIRR signal output
32	RFOK	O	RFOK signal output
33	DEFECT	O	DEFECT signal output
34	C. DEF		Connects DEFECT signal detection condenser
35	EFM-OUT	O	EFM comparator output
36	ASY	I	EFM comparator level input
37	TE-BAL	I	Tracking balance control
38	FE-BAL	I	Focus balance control

UPC2572GS

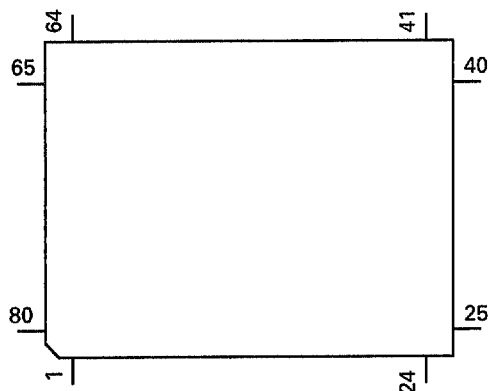


● Pin Functions (UPD63702GF)

Pin No.	Pin Name	I/O	Function and Operation
1	D.VDD		Supplies current of positive voltage to the logic circuits
2	RST	I	System reset input pin
3	AO	I	Microcomputer interface AO="L": $\overline{STB}$ active and set to address register AO="H": $\overline{STB}$ active and set to parameter
4	$\overline{STB}$	I	Signal to latch serial data within the LSI
5	SCK	I	Clock input pin to input and output serial data
6	SO	O	Outputs serial data and status signal
7	SI	I	Serial data input pin
8	D.GND		Logic circuit GND
9	X.GND		Crystal oscillation circuit GND
10	XTAL	I	Crystal oscillator connection pin
11	XTAL	O	Crystal oscillator connection pin
12	X.VDD		Supplies current of positive voltage to the crystal oscillation circuit
13	DA.VDD		Supplies current of positive voltage to the D/A converter
14	R+	O	Right channel analog audio data output pin
15	R-	O	Right channel analog audio data output pin
16,17	DA.GND		D/A converter GND
18	L-	O	Left channel analog audio data output pin
19	L+	O	Left channel analog audio data output pin
20	DA.VDD		Supplies current of positive voltage to the D/A converter
21	D.VDD		Supplies current of positive voltage to logic circuit
22	FLAG	O	Flag output pin to indicate that audio data currently being output consists of noncorrectable data
23	WDCK	O	Pin to output double the frequency of LRCK
24	C16M	O	Pin to output the clock
25	EMPH	O	Output pin for the pre-emphasis data in the sub-Q code
26	DIN	I	Input pin for serial audio data
27	DOUT	O	Output pin for the serial audio data
28	SCKO	O	Output pin for the clock for the serial audio data
29	LRCK	O	Signals to distinguish the right and left channels of the audio data output from DOUT. Frequency is 44.1kHz at 50% duty at normal regeneration
30	TX	O	Output pin for the digital audio interface data
31	CTLV	I	Oscillation control pin for high-frequency clock generation VCO used for the digital PLL upon regeneration at fast speed of 2- or 4-fold
32	POUT	O	Output point for phase comparison
33	D.GND		GND for the logic circuit
34	VCO	I	Input pin for the inverter
35	$\overline{VCO}$	O	Output pin for the inverter
36	D.VDD		Supplies current of positive voltage to the logic circuit
37	PLCK	O	Pin for monitoring the bit clock
38	LOCK	O	Indicates "H" when the synchronized pattern detection signal matches the frame counter output at the EFM recovery modulation, and "L" when they don't match
39	WFCK	O	Minute-cycle signal for the bit clock, the signal indicates the cycle of 1 frame (approx. 7.35kHz)
40	RFCK	O	Minute-cycle signal for the clock, the signal indicates cycle of 1 frame (approx. 7.35kHz)
41	D.GND		GND for the logic circuit
42,43	TEST0,1	I	Test pins
44,45	TM2, TM4	I	Pins for controlling regeneration at fast speed of 2- or 4-fold
46-49	T4-T7	I	Test pins
50,51	C1D1, C1D2	O	Output pin for indicating the C1 error correction results
52-54	C2D1-C2D3	O	Output pin for indicating the C2 error correction results
55	D.VDD		Supplies current of positive voltage to the logic circuit
56	SFSY	O	Outputs 1 word of the subcode. Generally, 1 cycle is approx 136 micro seconds
57	SBSY	O	The signal indicates the beginning of the subcode block. The SFSY signal is output at high level every 98 times

Pin No.	Pin Name	I/O	Function and Operation
58	SBSO	O	Output pin for the subcode data
59	SBCK	I	Input pin for the clock signal for read-out of the subcode data
60	A.GND		GND for the analog circuit
61	MD	O	Output pin for the spindle drive
62	SD	O	Output pin for the sled drive
63	TD	O	Output pin for the tracking drive
64	FD	O	Output pin for the focus drive
65	FBAL	O	Output pin for the focus balance control
66	TBAL	O	Output pin for the tracking balance control
67	A.VDD		Supplies current of positive voltage to the analog circuit
68	TBC	I	Switches coefficient banks for the tracking filter
69	EFM	I	Input pin for the EFM signal
70	HOLD	I	Input pin for the hold control signal
71	RFOK	I	Input pin for the RFOK signal
72	MIRR	I	Input pin for the MIRR signal
73	A.GND		GND for the analog circuit
74,75	VR2,1	I	The signal input through these pins is digitized to 8-bit by the A/D converter, which by operation of the assigned register, can be read into the microcomputer
76	FE	I	Inputs a focus-error signal from the RF amplifier
77	TE	I	Inputs a tracking-error signal from the RF amplifier
78	TEC	I	Input pin for the tracking comparator
79	REFOUT	O	Output point for midpoint potential for the A/D converter for the LSI portion
80	A.VDD		Supplies current of accurate voltage to the analog circuit

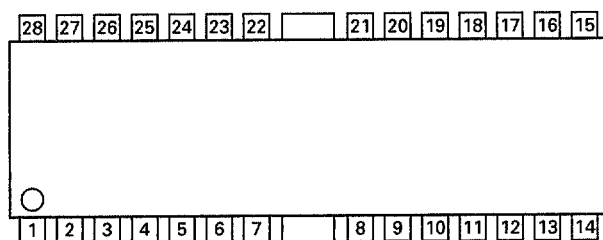
*UPD63702GF



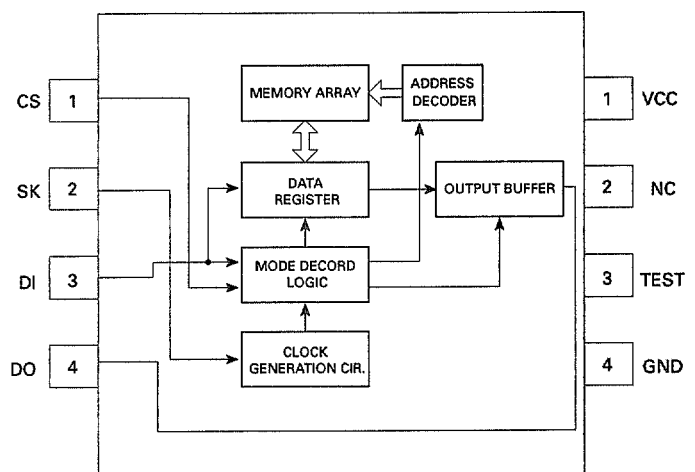
IC's marked by* are MOS type.

Be careful in handling them because they are very liable to be damaged by electrostatic induction.

XLA6997FP



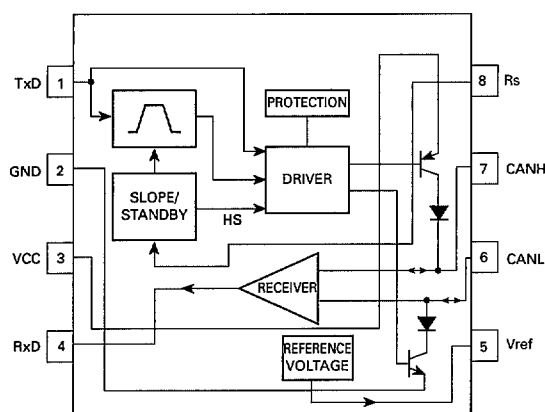
*S-29220A



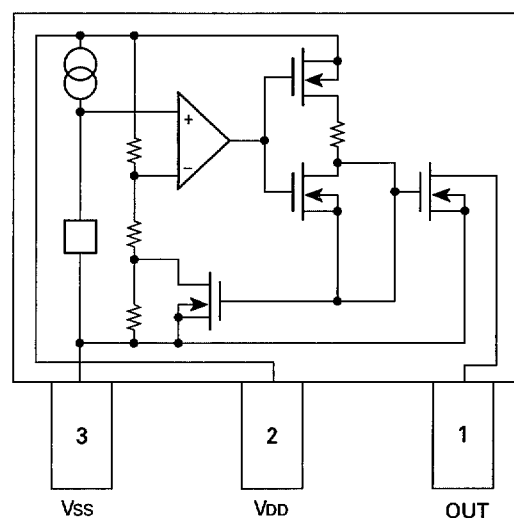
● Pin Functions (XLA6997FP)

Pin No.	Pin Name	I/O	Function and Operation
1	OUT1-A	O	CH1 driver output
2	OUT1-B	O	CH1 driver output
3	IN1	I	CH1 input
4	IN1'	I	CH1 gain adjustment input
5	REG-B		PowTr base connection pin for regulator
6	REG OUT	O	Regulator output PowTr collector connection pin
7	REG GND		Regulator GND/Common circuit GND
8	BIAS	I	BIAS input
9	MUTE		Mute control pin
10	REG SW		Regulator switch pin
11	TEMP MON		Humidity monitor pin
12	IN2	I	CH2 input
13	OUT2-B	O	CH2 driver output
14	OUT2-A	O	CH2 driver output
15	GND		GND
16	OUT3-A	O	CH3 driver output
17	OUT3-B	O	CH3 driver output
18	IN3''		CH3 gain adjustment pin
19	IN3'		CH3 gain adjustment pin
20	IN3	I	CH3 input
21,22	VCC		VCC
23	IN4	I	CH4 input
24	IN4'		CH4 gain adjustment pin
25	IN4''		CH4 gain adjustment pin
26	OUT4-B	O	CH4 driver output
27	OUT4-A	O	CH4 driver output
28	GND		GND

*PCA82C250T



*S-80763ANJT

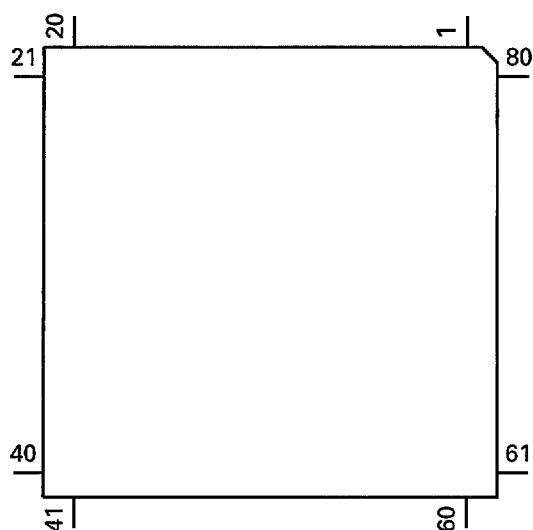


● Pin Functions(PD4631A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	MOD	I		Destination sense analog input
2	RSL	I		Sub tuner signal level analog input
3	RSD	I		Sub tuner station detector input
4	AVSS			A/D GND
5	ILLCON	O	C	Illumination power analog output
6	DINJ	O	C	Disc set indicator control output
7	AVREF1			(D/A converter standard voltage)
8	PDI	I		PLL data input
9	PDO	O	C	PLL data output
10	PCK	O	C	PLL clock output
11	RDI	I		Serial data input for RDS IC
12	RDO	O	C	Serial data output for RDS IC
13	RCK	O	C	Serial clock output for RDS IC
14	BSRQ	I		P-BUS serial pole request input
15	BRXEN	I/O	/C	P-BUS reception enable input/output pin
16	BRST/TSI	O	C	P-BUS reset output
17	BSIO/TSO	I/O	/C	P-BUS serial data input/output
18	BSCK/TCK	I/O	/C	P-BUS serial clock input/output
19-26	D0-7	I/O	/C	Address/data
27	A8	O	C	Address
28	CS	I		CAN BUS chip select
29	RST	O	C	CAN BUS IC reset
30-32	VOL1-3	I		Rotary encoder input
33	VSS			GND
34	MS	I		Cassette mechanism MS sense input
35	MTL	I		Cassette mechanism METAL detector input
36	LOAD	I		Cassette mechanism Loading detection input
37	POS	I		Cassette mechanism position sense input
38	RES	I		Cassette mechanism reverse end sense input
39	NES	I		Cassette mechanism normal end sense input
40	RD	O	C	Read signal input
41	WR	O	C	Write signal input
42	WAIT	I		Outside wait signal input
43	ASTB	O	C	Timing output for extension RAM
44	RPCE	O	C	RDS PLL chip enable
45	B.C/TUMUT	O	C	Tuner mute output/Dolby V output
46	TELON	O	C	Select output of outside input
47	SD	I		Station detector input
48	SMUT	O	C	Mute output
49	SYSPW	O	C	System power supply control output
50	AMPB	O	C	Amplifier power output
51	ECE	O	C	EEPROM enable output
52	ECK/VCK	O	C	EEPROM/E.VOL clock output
53	EDO/VDT	O	C	EEPROM/E.VOL data output
54	EDI	I		EEPROM data input
55	PCE/VST	O	C	PLL chip enable/E.VOL strobe output
56	NC			Not used
57	RRST	O	C	Reset output for RDS IC
58	RSEL	O	C	Select output for RDS IC
59	RRDY	I		Ready input from RDS IC
60	RESET	I		Reset input
61	INT	I		CAN BUS squeeze signal input
62	BSENS	I		Back up power sense input
63	IGSEN	I		ACC power sense input
64	POWER	I		CD +5V control
65	TELIN	I		Telephone mute input
66	CSEJ	I		Tape eject SW input

Pin No.	Pin Name	I/O	Format	Function and Operation
67	VOL0	I		Rotary encoder edge input
68	VDD			Power supply
69	X2			Crystal oscillator connection pin
70	X1			Crystal oscillator connection pin
71	IC			GND
72	XT2			Sub clock
73	TESTIN	I		Test program mode input
74	AVDD			Positive power supply terminal for analog circuit
75	AVREF0			GND
76	SL	I		Signal level input
77	BASS	I		A/D converter input from BASS volume
78	TRE	I		A/D converter input from TREBLE volume
79	BAL	I		A/D converter input from BALANCE volume
80	FAD	I		A/D converter input from FADER volume

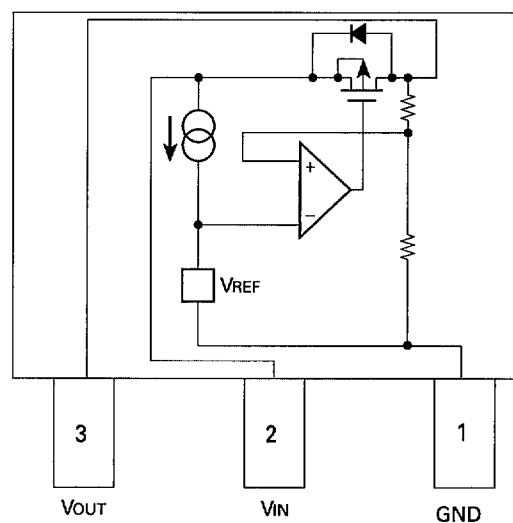
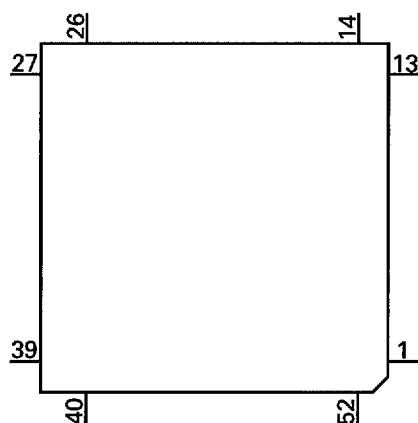
*PD4631A



Format	Meaning
C	C MOS

*S-81250PGPD

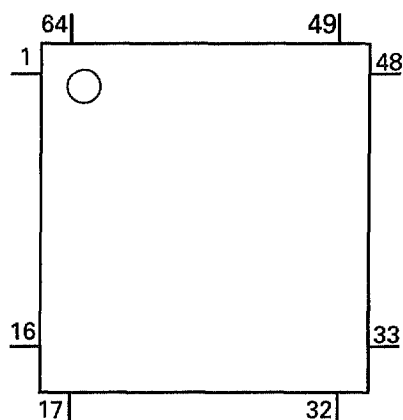
*GGC1191(UPC72005GC(A))



● Pin Functions GGC1191(UPC72005GC(A))

Pin No.	Pin Name	I/O	Function and Operation
1	RX1	I	Input data of CAN BUS
2	RX0	I	Input data of CAN BUS
3	AVSS		A/D GND
4	AVDD		Positive power supply terminal for analog circuit
5	TX1	O	Output data of CAN BUS
6	TX0	O	Output data of CAN BUS
7	VSS		GND
8	VDD		Power supply
9	BSSEL	I	Select port for inter face
10	WAIT	O	Memory access WAIT signal
11	ASTB	I	Memory access address T signal
12	RD	O	Memory access WAIT signal
13	WR	O	Memory access WAIT signal
14	CS	I	Memory access chip select pin
15	A8	I	Address line bit 8
16-23	D7-0	I/O	Address data bit 7
24-27	KDT0-3	I	Key data input
28-31	KST0-3	O	Key strobe output
32	VDD		Power supply
33	VSS		GND
34	F/R	O	Cassette mechanism head forward/reverse select output
35	PLAY	O	Tape MS filter select output
36	NR	O	NR output
37	SC2	O	Cassette mechanism sub motor control output
38	SC1	O	Cassette mechanism sub motor control output
39	CM	O	Cassette mechanism capstan motor control output
40	STBY	I	Stand-by input terminal
41	WKUP	O	BUS wake up output
42	INT	O	Squeeze signal output
43	IC		GND
44	RESET	I	Reset input
45	VDD		Power supply
46	VSS		GND
47	X1		Crystal oscillator connection pin
48	X2		Crystal oscillator connection pin
49	CVSS		Clock VSS
50	CVDD		Clock VDD
51	REL	I	Cancellation port of stop mode
52	CKSEL	I	Master clock frequency select input

*PD4663A



● Pin Functions(PD4663A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	NC			Not used
2	XRST	O	C	CD LSI reset output
3-7	NC			Not used
8	CLAMP	I		Disc clamp sense input
9	VSS			GND
10	NC			Not used
11	EJET	O	C	Loading motor eject control output
12	LOAD	O	C	Loading motor load control output
13	CONT	O	C	Servo driver power supply control
14	NC			Not used
15	CDMUTE	O	C	CD mute output
16	NC			Not used
17	ADENA	O	C	A/D reference voltage output
18-23	NC			Not used
24	VSS			GND
25-30	NC			Not used
31	BRXEN	I/O	/C	P-BUS reception enable input/output
32	BSRQ	O	C	P-BUS serial pole request input
33	VDCON	O	C	VD control output
34	CD5VON	O	C	CD +5V power supply control output
35	RESET	I		Reset input
36	TXARJ	I		Set up of TX output select input
37	EJSW	I		Eject switch input
38	BREST	I		P-BUS reset input
39	CMPAPI	I		Compression select input
40	VDD			Power supply
41	X2			Crystal oscillator connection pin
42	X1			Crystal oscillator connection pin
43	IC			GND
44	NC			Not used
45	TESTIN	I		Test program mode input
46	AVSS	I		A/D GND
47	TEMP	I		Temperature detector input
48	VDSENS	I		Over voltage sense input
49	EJTD	I		Disc EJECT position detect input
50	DINC	I		Disc detect input
51	NC			Not used
52	FOK	I		FOK signal input
53	MIRR	I		MIRR detection signal input
54	LOCK	I		Spindle lock detector input
55	AVDD			Positive power supply terminal for analog circuit
56	AVREF	I		A/D converter reference voltage
57	XSO	I		LSI data input
58	XSI	O	C	LSI data output
59	XSCK	O	C	LSI clock output
60	XSTB	O	C	CD LSI strobe output
61	XA0	O	C	Control signal distinguishing data output
62	NC			Not used
63	BDATA	I/O	/C	P-BUS serial data input/output
64	BSCK	I/O	/C	P-BUS serial clock input/output

Format	Meaning
C	C MOS

7.2 DIAGNOSIS

7.2.1 DISASSEMBLY

● Removing the Case(not shown)

1. Insert and turn a flat screwdriver to remove the case.

● Removing the Grille Assy

1. Removing the four screws.
2. Removing the grille assy.

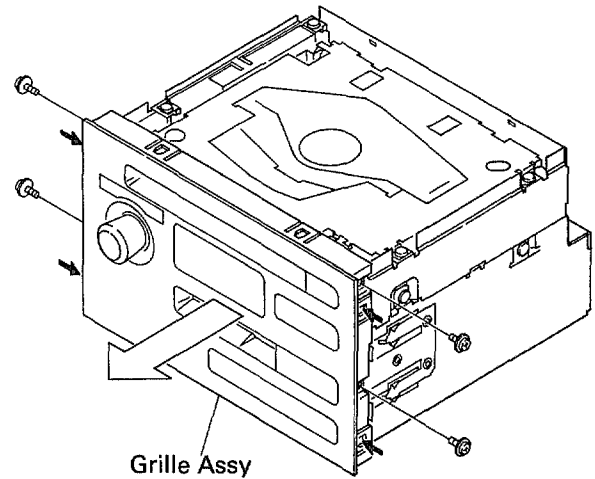


Fig.17

● Removing the CD Mechanism Module

1. Removing the four screws.
2. Disconnect the connector.
3. Removing the CD mechanism module.

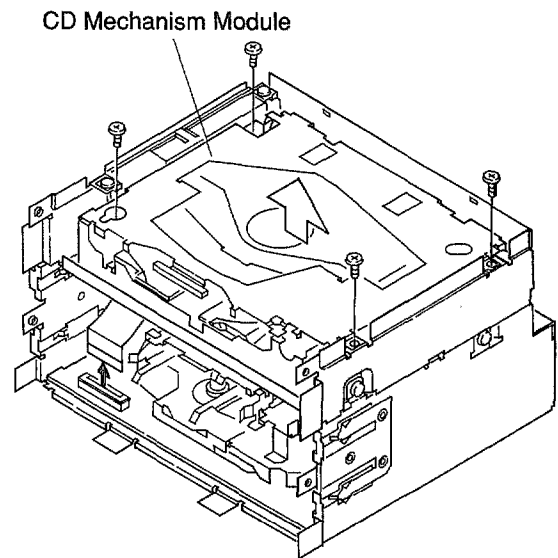


Fig.18

● Removing the Chassis Unit and Case

1. Removing the five screws.
2. Removing the chassis unit and case.

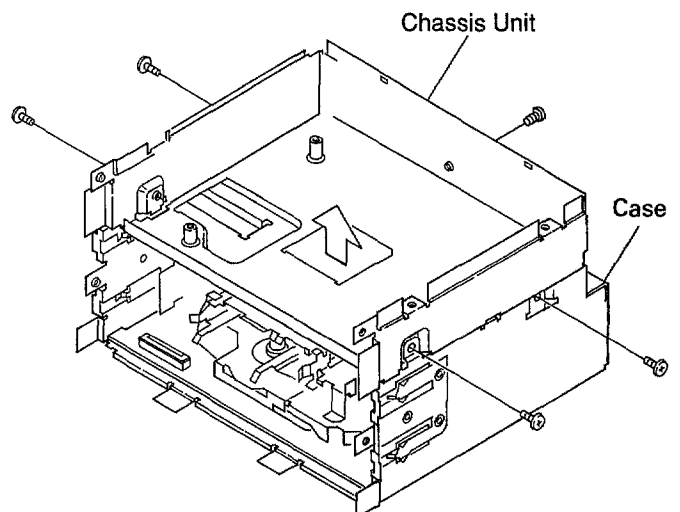


Fig.19

● Removing the Tuner Mother PCB and Connector PCB

1. Removing the seven screws.
2. Disconnect the connector and connector PCB.
3. Unbend the tabs at two locations indicated by arrows until straight.
4. Removing tuner mother PCB.

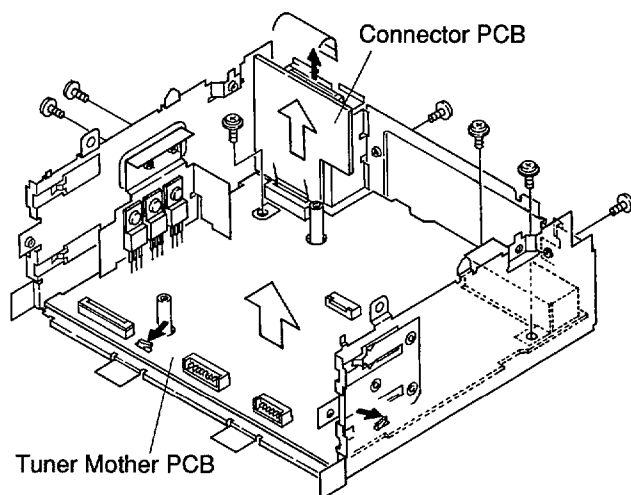
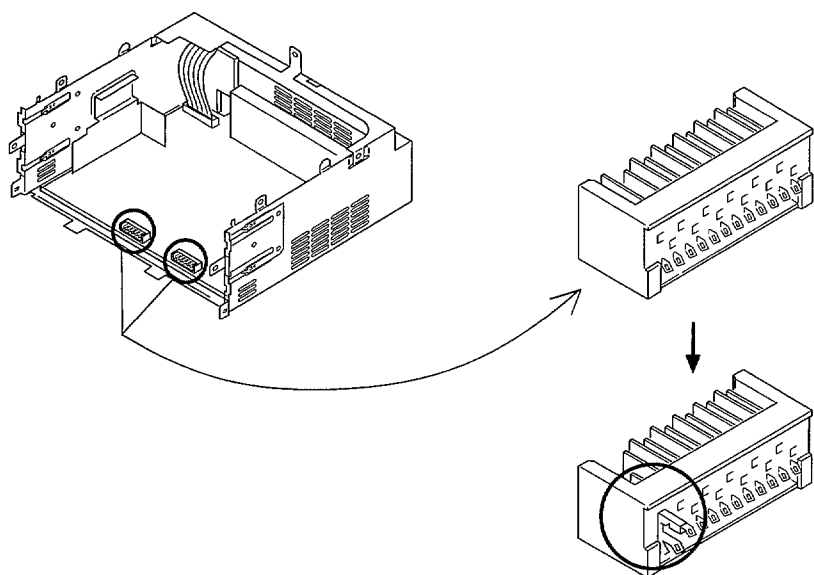


Fig.20

● Cautions on assembling

When mounting the grille assy on the chassis, be careful not to push tuner mother PCB connector pins. They might move to the rear side as shown in Fig.22 if the grille assy is mounted slantingly or forcibly. therefore, after mounting the grille assy, perform a visual check for the connector pins from the side chassis holes.



A few pins might be out of position.

Fig.21

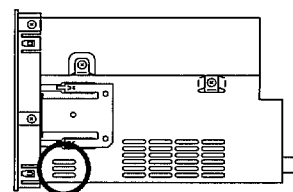


Fig.22

7.2.2 TEST MODE

● CD Test Mode

1)Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFO(approx. 2.5V) instead of GND.

If REFO and GND are connected to each other by mistake during adjustments, not only will it be impossible to measure the potential correctly, but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this, take special note of the following.

Do not connect the negative probe of the measuring equipment to REFO and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFO with the channel 2 negative probe connected to GND.

Since the frame of the measuring instrument is usually at the same potential as the negative probe, change the frame of the measuring instrument to floating status.

If by accident REFO comes in contact with GND, immediately switch the regulator or power OFF.

- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.
- Before proceeding to further adjustments and measurements after switching regulator ON, let the player run for about one minute to allow the circuits to stabilize.
- Since the protective systems in the units software are rendered inoperative in test mode, be very careful to avoid mechanical and /or electrical shocks to the system when making adjustment.

- Test mode cancellation
Switch ACC, back-up OFF.

- Disc detection during loading and eject operations is performed by means of a photo transistor in this unit. Consequently, if the inside of the unit is exposed to a strong light source when the outer casing is removed for repairs or adjustment, the following malfunctions may occur.

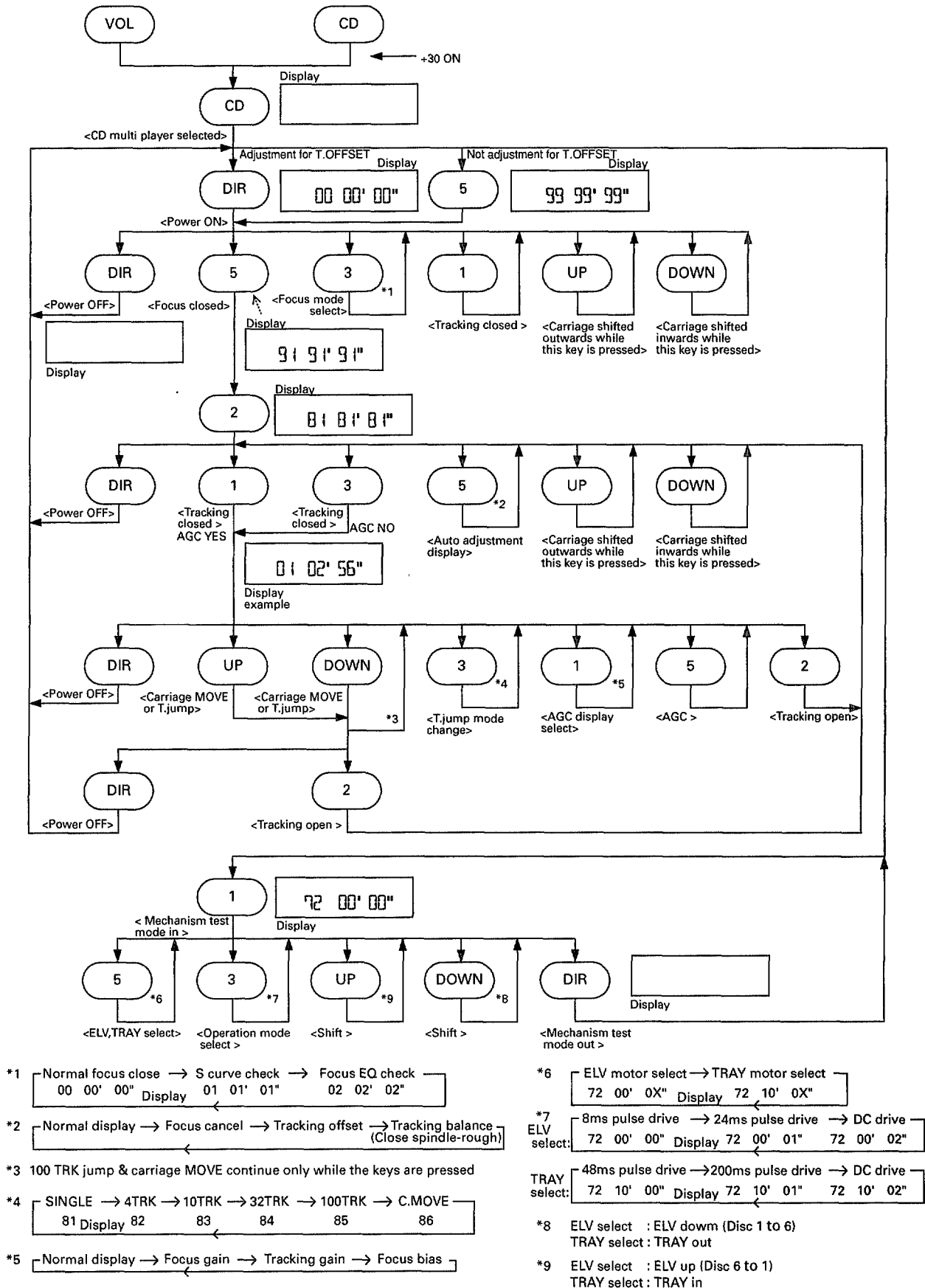
*During PLAY, even if the eject button is pressed, the disc will not be ejected and the unit will remain in the PLAY mode.

*The unit will not load a disc.

When the unit malfunctions this way, either re-position the light source, move the unit or cover the photo transistor.

- When loading and unloading discs during adjustment procedures, always wait for the disc to be properly clamped or ejected before pressing another key. Otherwise, there is a risk of the actuator being destroyed.
- Turn power off when pressing the button TR+ or the button TR- key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)
- SINGLE/4TRK/10TRK/32TRK will continue to operate even after the key is released. Tracking is closed the moment C-MOVE is released.
- JUMP MODE resets to SINGLE as soon as power is switched OFF.

● Flow Chart(Multi CD)



● Error Number Indication

If the CD should fail to operate or if an error has taken place during operation the player will enter into the error mode, and the cause of the error will be numerically indicated.

This is aimed at assisting in analysis or repair.

(1) Examples of Display Err-XX

(2) Error Codes

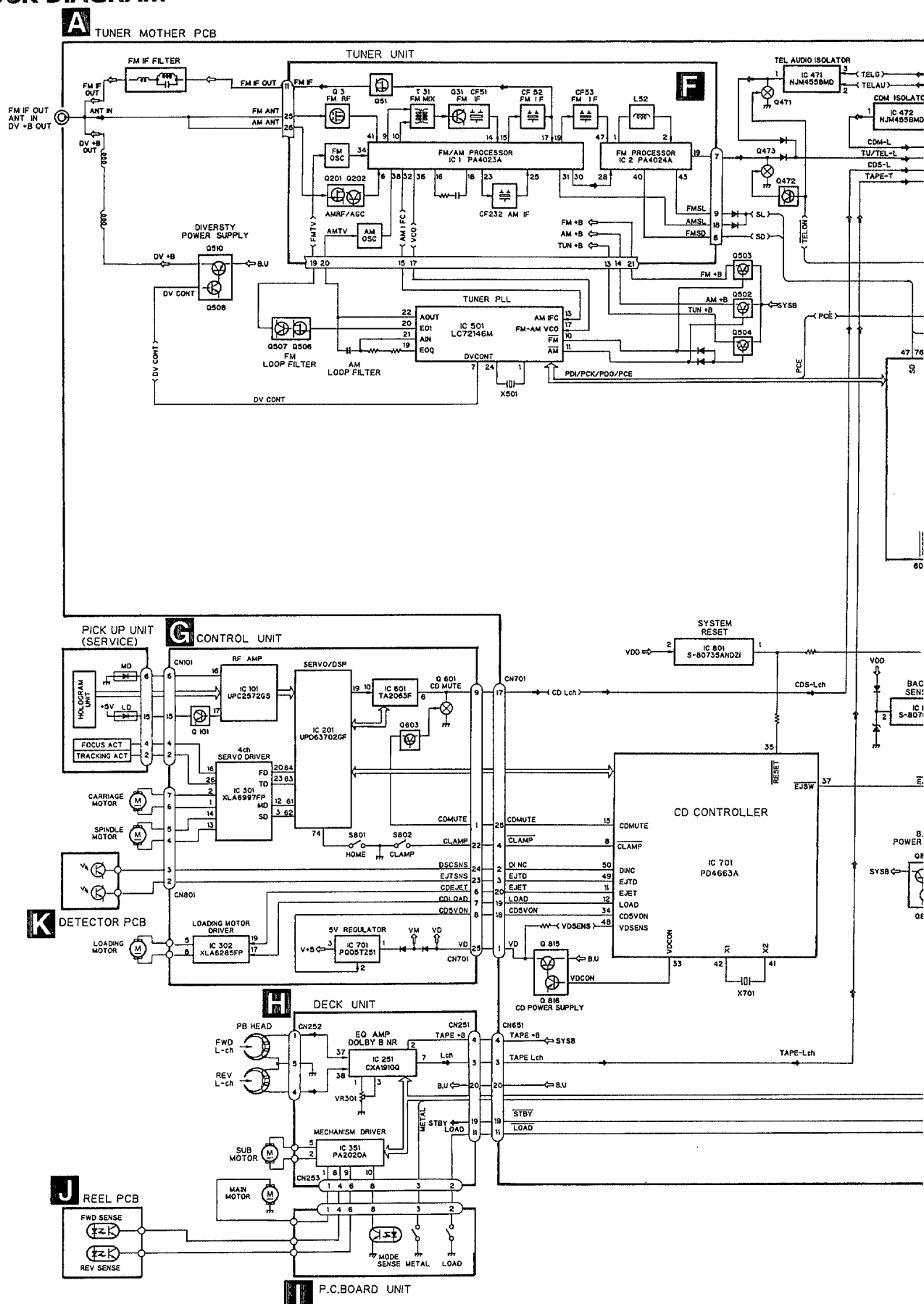
Error Code	Classification	Description	Cause/Detail
10	ELECTRIC	Carriage home failure	Carriage doesn't move to or from the innermost position →Home switch failed and/or carriage immobile
11	ELECTRIC	Focus failure	Focus failed →Defects, disc upside-down, severe vibration
12	ELECTRIC	SETUP failure Subcode failure	Spindle failed to lock or subcode unreadable →Spindle defective, defect, severe vibration
14	ELECTRIC	Mirror failure	Unrecorded CD-R The disc is upside-down, defects, vibration
17	ELECTRIC	Set up failure	AGC protect failed →Defects, disc upside-down, severe vibration
19	ELECTRIC	Set up failure	Tracking error waveform is too unbalanced (>50%) or level is too small →The P.U.unit or tracking error circuitry is N.G.
30	ELECTRIC	Search time out	Failed to reach target address →Carriage/tracking defective and/or defects
A0	SYSTEM	Power failure	Power overvoltage or short circuit detected →Switching transistor defective and/or power abnormal
A1	SYSTEM	Mechanism power failure	Mechanism elevation reference voltage is out of prescription →EREF adjustment VR and/or power abnormal
50	MECHANISM	An error upon ejection	MAG switch release time has time out Elevation time out when eject
60	MECHANISM	An error while putting in and out the tray	Tray in / out time has time out Tray is caught when put in
70	MECHANISM	An error upon elevation	Elevation time has time out
80	MECHANISM	An error with an empty magazine inserted	No disc is available

* Setup means a series of operations after focusing up to sound output.

A1,50,60,70,80 : error code of multi CD

7.3 EXPLANATION

7.3.1 BLOCK DIAGRAM



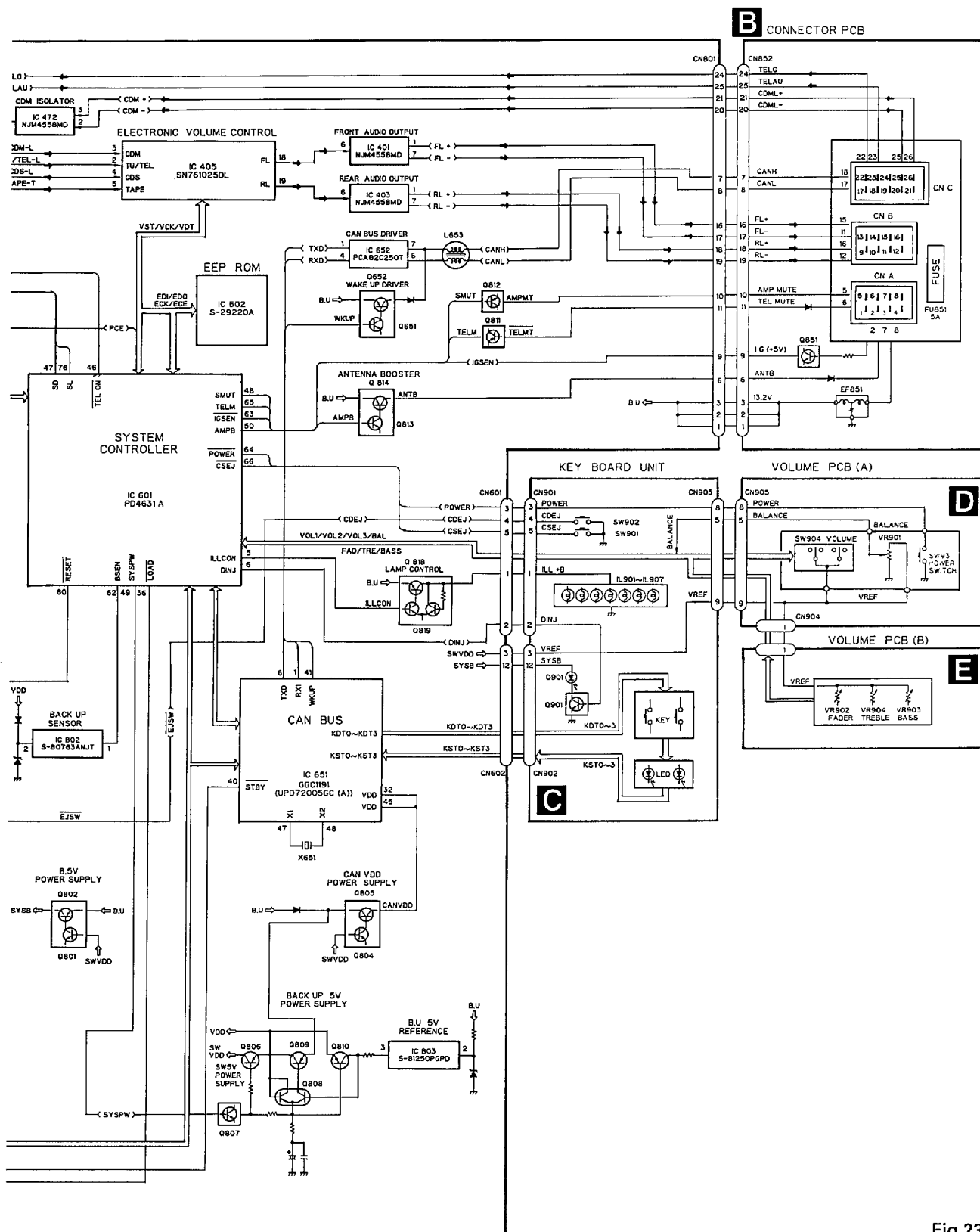


Fig.23

7.3.2 SYSTEM

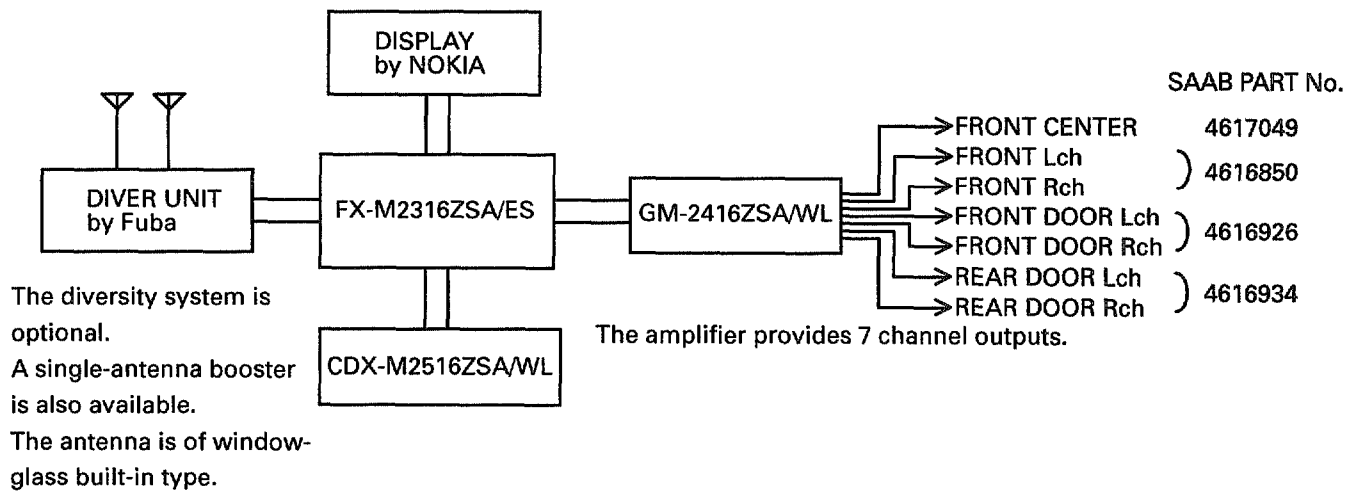


Fig.24

7.3.3 JIG

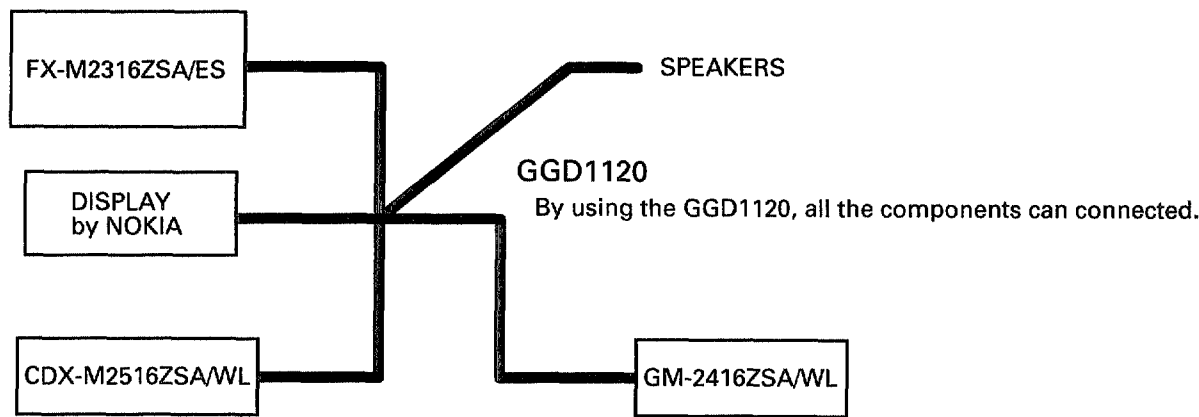


Fig.25

7.3.4 LEVEL DIAGRAM

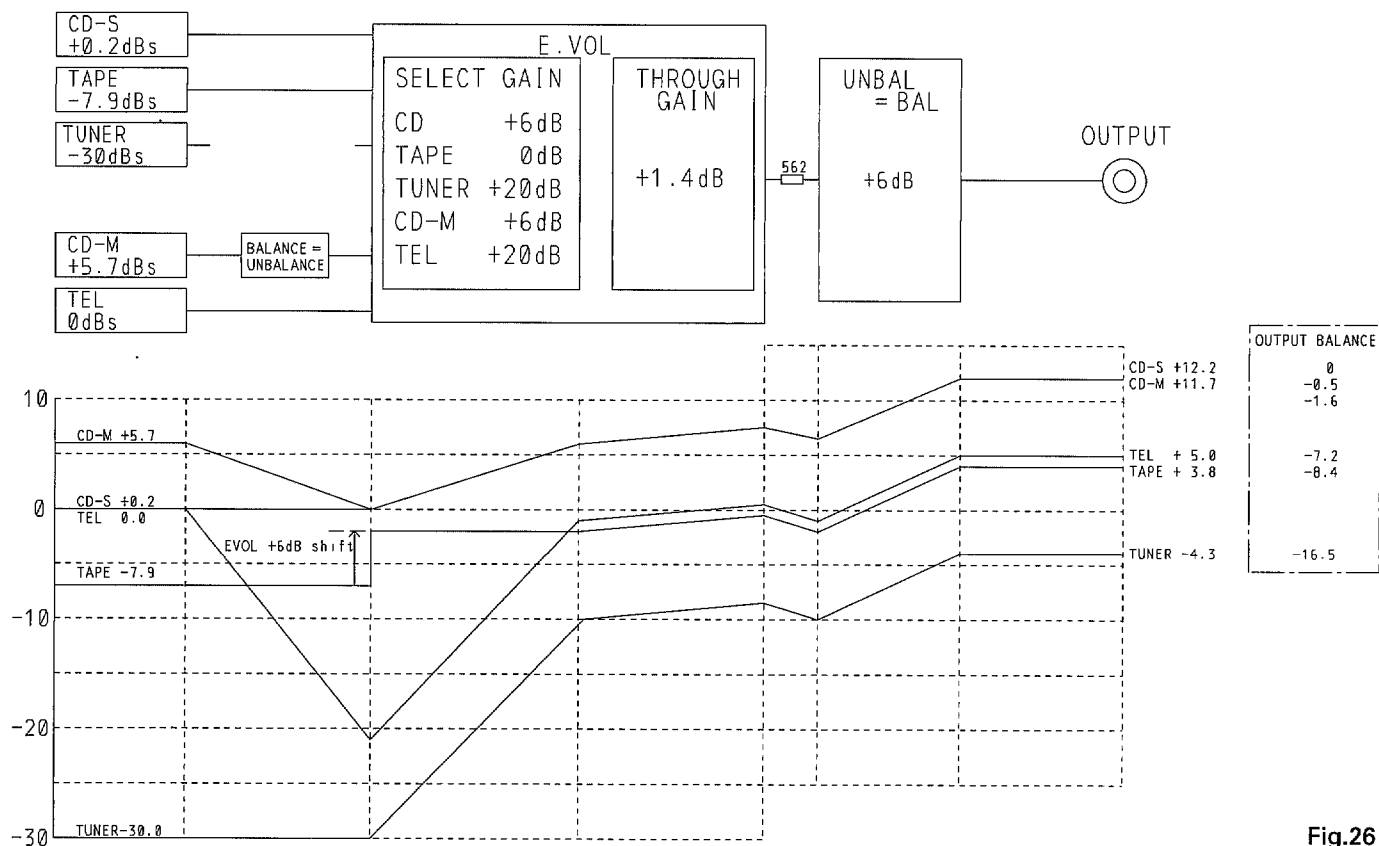


Fig.26

8. OPERATIONS AND SPECIFICATIONS

8.1 OPERATIONS

● TAPE

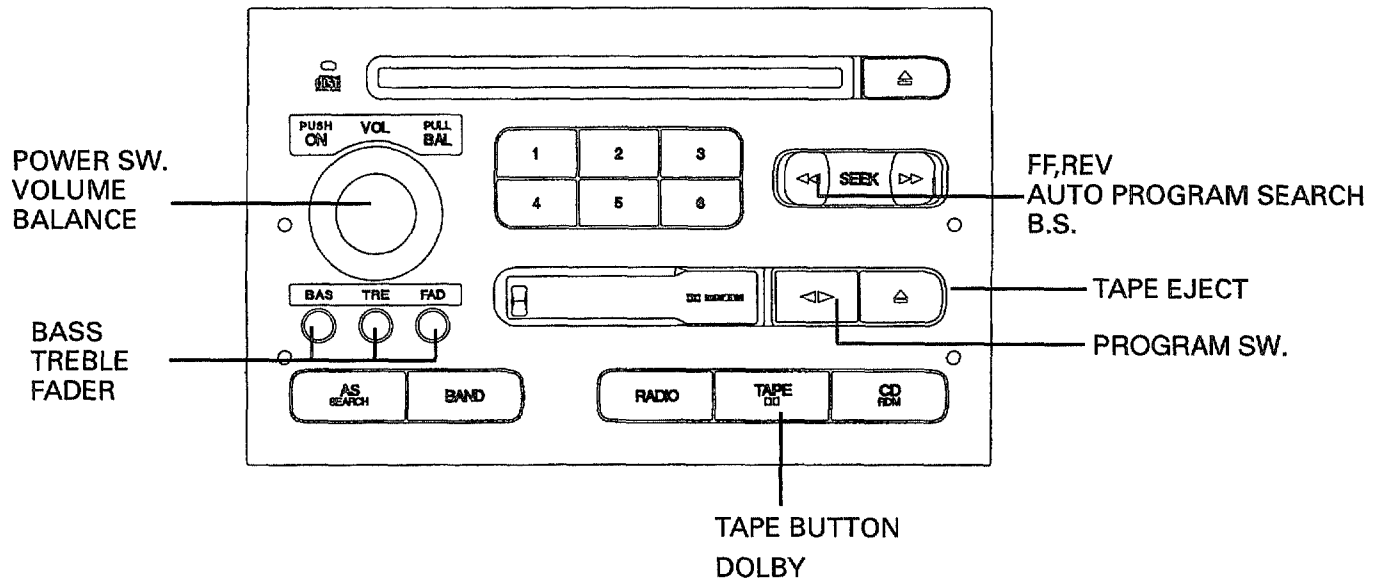


Fig.27

● RADIO

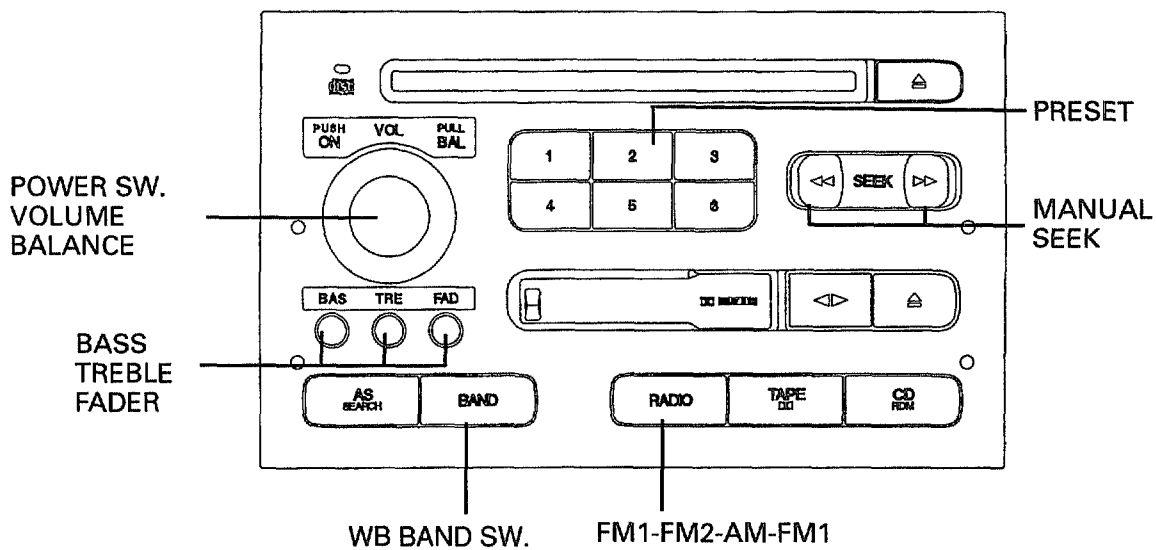


Fig.28

● CD

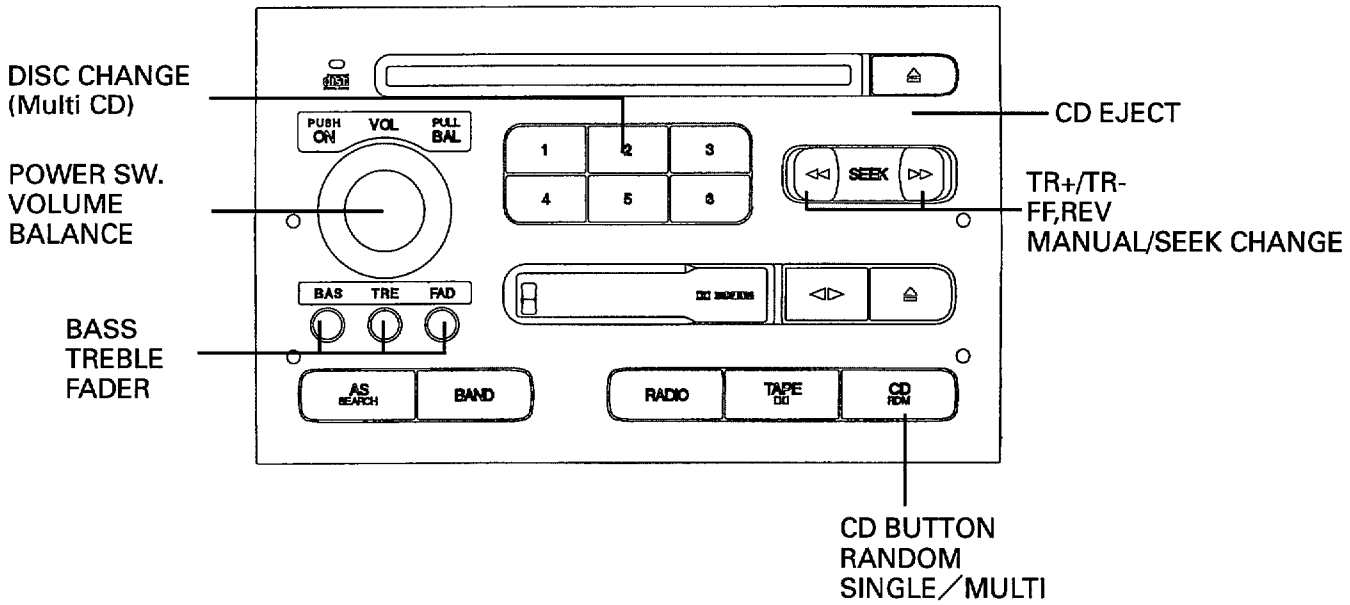
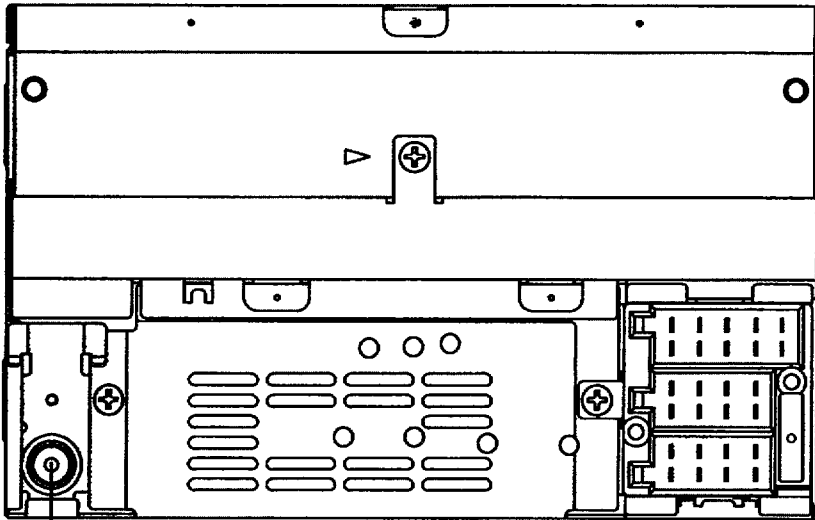
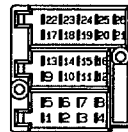


Fig.29

8.2 CONNECTOR



④ ISO CONNECTOR CONNECTOR PIN LOCATION



Power supply, control input (level 3)

pin 1 NC
pin 2 +12V ignition voltage (+B)
pin 3 NC
pin 4 chassis ground
pin 5 Amplifier mute
pin 6 Telephone-mute control input
pin 7 +12V antenna remote
pin 8 +12V battery voltage (+30)

Speaker output (level 2)

pin 9 RR ground
pin 10 FR ground
pin 11 FL ground
pin 12 RL ground
pin 13 RR signal
pin 14 FR signal
pin 15 FL signal
pin 16 RL signal

Databus, CD-input (level 1)

pin 17 EBUS data-line wire 1 (low)
pin 18 EBUS data-line wire 2 (high)
pin 19 NC
pin 20 CD audio input signal right
pin 21 Telephone ground
pin 22 CD audio input signal (mono)
pin 23 CD audio ground
pin 24 CD audio ground left
pin 25 CD audio input signal left

Fig.30

AUDIO

Balance charact-30dB or less

Separation 70dB or more

Distortion 2% or less

Separation 25dB or more

Distortion 1.0% or less

Service Manual

ORDER NO.
CRT1829

CD MECHANISM MODULE

CX-597

- This service manual describes the operation of the CD mechanism incorporated in models listed in the table below.
- When performing repairs use this manual together with the specific manual for model under repair.

Model	Service Manual	CD Mechanism Module	CD Mechanism Unit
DEH-P825R/EW, DEH-P825/UC DEH-P823/ES, DEX-P99/UC	CRT1805	CXK5011	CXA8880
DEH-P725R/EW, DEH-P725R-W/EW DEH-P725/UC, DEH-P725-W/UC DEH-P723/ES, DEH-P625/UC DEX-P88/UC, DEX-P77R/EW	CRT1812	CXK5001	CXA8870
DEH-625R/EW, DEH-624R/EW DEH-525R/EW, DEH-524R/EW DEH-424R/GR, DEH-424/EW DEH-425/IT	CRT1808	CXK5001	CXA8870
DEH-59/UC, DEH-52/UC DEH-525/UC, DEH-49/UC DEH-42/UC, DEH-425/UC DEH-225/UC, DEH-523/ES DEH-323/ES, DEH-223/ES	CRT1809	CXK5001	CXA8870

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1. THE SUMMARY OF CIRCUITS

1.1 PRE-AMP SECTION (UPC2572GS: IC101)

This section processes the pickup output signals to create the signals for the servo, demodulator & control.

The pickup output signals are I-V converted by the pre-amp with built in photo-detector in the pickup, and added by the RF amp (IC101) to obtain the RF, FE, TE, TE zero cross, and other signals.

The main component is the UPC2572GS and each section is explained below. Because this system has a single power supply (+5V), the reference voltage for this IC, the PU and the servo circuit is the voltage REFO (+2.5V). The REFO signal is obtained by buffering REFOUT from the servo LSI (IC201: UPD63702GF) and is available from Pin 19 of IC101. All measurements should be done using this REFO as reference.

Note: During measurement, do not short REFO and GND.

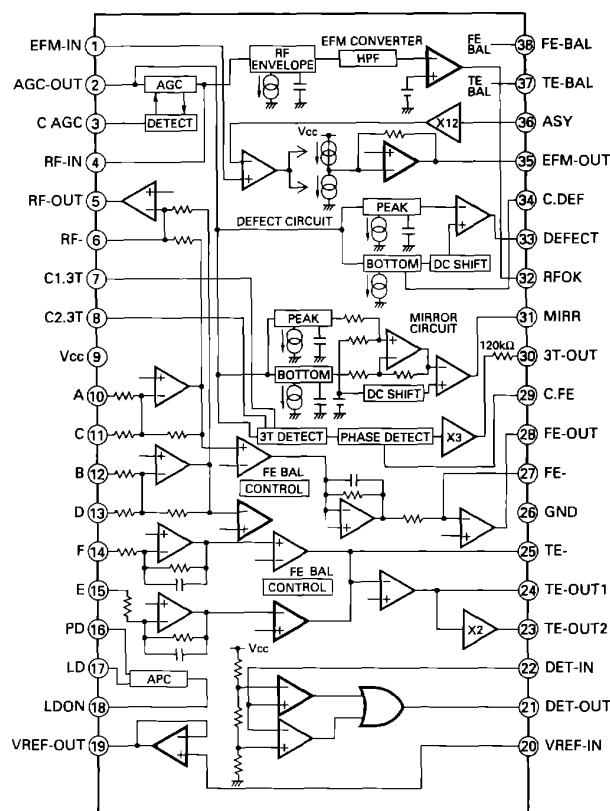


Fig.1 : UPC2572GS BLOCK DIAGRAM

1) APC Circuit (Automatic Power Control)

When the laser diode is driven with constant current, the optical output has large negative temperature characteristics. So the current must be controlled to hold the output constant with the monitor diode. The circuit that carries out this function is the APC circuit. The LD current is obtained by measuring the voltage between LD1 and ground and the value of this current is about 35mA.

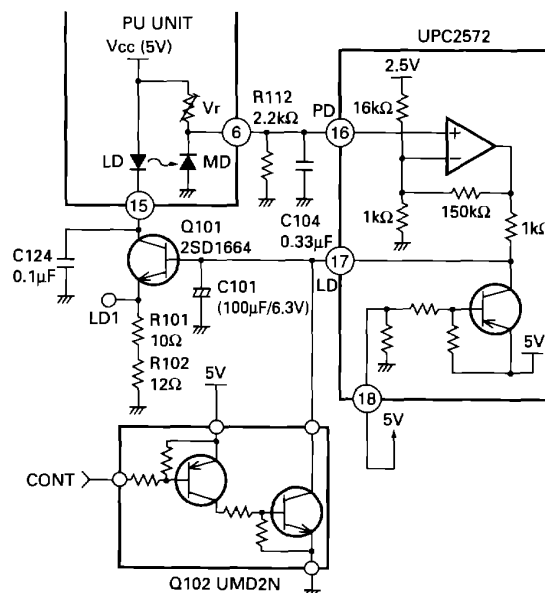


Fig.2 : APC CIRCUIT

2) RF Amp, RF AGC Amp

The photo-detector outputs (A+C) and (B+D) are added, amplified, and equalized in IC101 and output to the RFI pin. (The eye pattern can be checked at this pin.)

The RFI voltage low-frequency component is:

$$RFI = (A+B+C+D) \times 3.22$$

R111 is the offset resistor for holding the RFI signal in the pre-amp's output range. The RFI signal is AC coupled and input to Pin 4 (RFIN pin).

This IC contains an RF AGC circuit, which holds the RFO output at Pin 2 at a fixed level ($1.2 \pm 0.2V_{p-p}$). This RFO signal is used in the EFM, DFCT, and MIRR circuits.

3) EFM Circuit

This circuit, "squares" up the analog RF signal into a digital EFM signal. In order to ensure minimum errors it is necessary to use a feedback circuit to match the DC level of the threshold to the center of the RF waveform.

This circuit uses the fact that the EFM signal should have no DC component. By feeding back the EFM signal's DC level the threshold level changes until the DC level is zero and the threshold, by definition, is at the exact center of the RFO waveform. The filtering in the feedback has been adjusted to ensure minimum error. The EFM signal is output from Pin 35. The signal is a 2.5Vp-p amplitude signal centering on REFO.

4) DFCT (Defect) Circuit

The DFCT circuit detects defects on the disc surface, and outputs a "H" signal from Pin 33.

If there is dirt on the disc, drop outs may appear. The DFCT signal output is input to the servo LSI HOLD pin and the focus and tracking servo drives are held while the DFCT output is "H" in order to improve playability.

5) RFOK Circuit

This circuit produces the signal indicating the focus close state during play and the timing for closing the focus servo. This signal is output from Pin 32. This RFOK signal output is input to the servo LSI RFOK pin and the focus close command is issued by the servo LSI. This signal is high during play when the focus is closed.

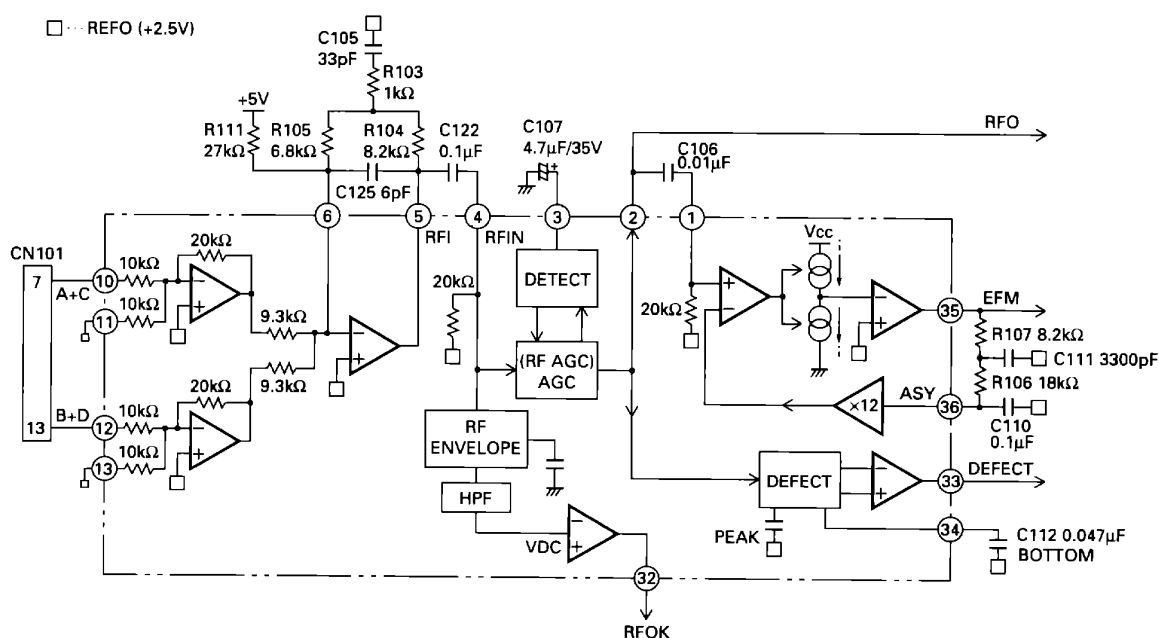


Fig.3 : RF AMP, RF AGC, EFM, DFCT, RFOK CIRCUIT

6) Focus Error Amp

The photo-detector outputs (A+C) and (B+D) are passed through a differential amp, and an error amp and (A+C-B-D) is output from Pin 28 as the FE signal. The FEY voltage low-frequency component is:

$$FEY = (A+C-B-D) \times \frac{20k\Omega}{10k\Omega} \times \frac{90k\Omega}{68.8k\Omega} \times \frac{R108}{17.2k\Omega}$$

: (PU FE level $\times$ 5.02)

An S curve of about 1.6Vp-p is obtained with REFO as the reference. The final-stage amp cutoff frequency is 12.4kHz.

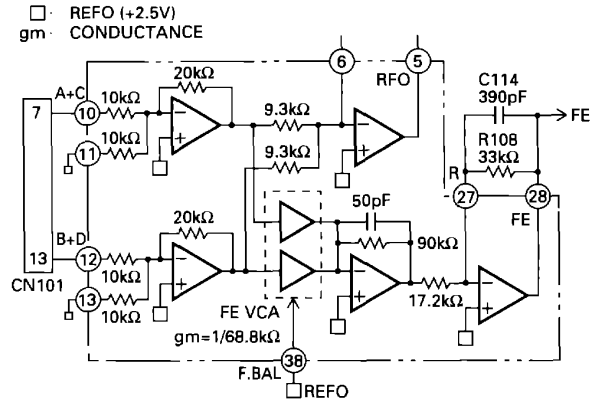


Fig.4 : FOCUS ERROR AMPLIFIER

7) Tracking Error Amp

The photo-detector E and F outputs are passed through a differential amp and an error amp and (E-F) is output from Pin 24 as the TE signal. The TEY voltage low-frequency component is:

$$TEY = (E-F) \times \frac{63k\Omega}{(31k\Omega+16k\Omega)} \times \frac{R109}{17k\Omega}$$

: (PU TE output level $\times$ 5.36)

The TE waveform of about 1.5Vp-p with REFO as the reference is obtained as the TE output (Pin 24). The final-stage amp cutoff frequency is 19.5kHz.

8) Tracking Zero Crossing Amp

The tracking zero crossing signal (below, TEC signal) is the TE waveform (Pin 24 voltage) amplified four times and is used to find the zero crossing points of the tracking error with the UPD63702GF servo LSI. This zero crossing point is found for the following two reasons.

- (1) To count tracks for carriage moves and track jumps
- (2) To detect the direction in which the lens is moving for tracking closing (This is used in the tracking brake circuit, described Page 9 b).)

The TEC signal frequency range is 500Hz - 19.5kHz.

$$TEC \text{ voltage} = TE \text{ level} \times 4$$

In other words, the TEC signal level is calculated at 6Vp-p. This level exceeds the op-amp's output range and the signal is clipped, but this can be ignored because this signal is used by the servo LSI only at the zero crossing point.

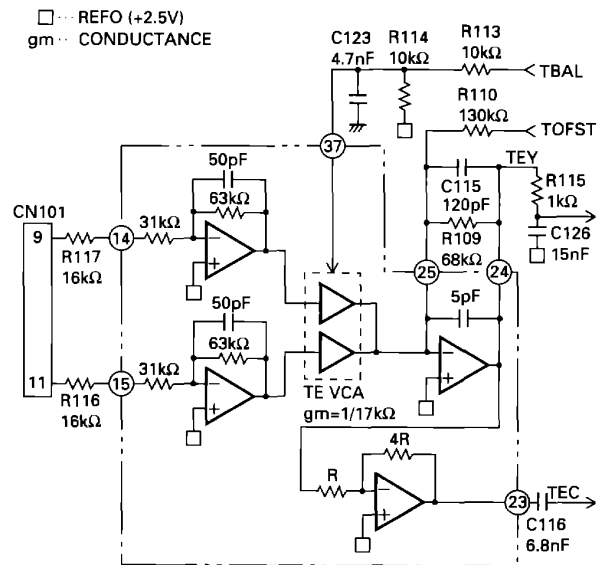


Fig.5 : TRACKING ERROR AMPLIFIER & TRACKING ZERO CROSSING AMPLIFIER

9) MIRR (Mirror) Circuit

The MIRR signal shows the on track and off track data and is output from Pin 31.

When the laser beam is

On track: MIRR = "L"

Off track: MIRR = "H"

This signal is used in the brake circuit, described Page 9 b).

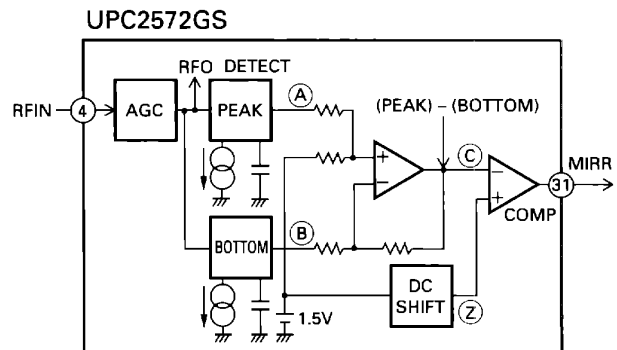


Fig.6 : MIRR CIRCUIT

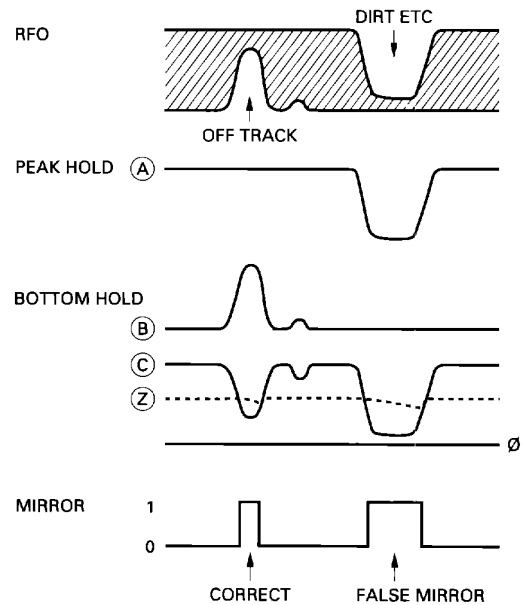


Fig.7 : MIRR CIRCUIT & SIGNAL DIAGRAM

10) 3TOUT Circuit

This circuit detects variations of the RF signal when an external interference is input into the focus servo loop and outputs the phase difference between the FE signal and the RF level variation signal from Pin 30. The signal has been passed through a low-pass filter ($f_c = 40\text{Hz}$). This signal is used for the FE bias automatic adjustment, described Page 12 4).

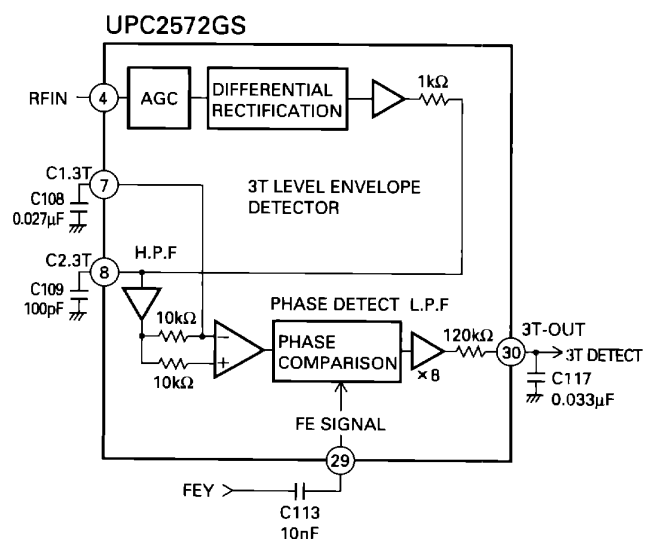


Fig.8 : 3T OUT CIRCUIT

1.2 SERVO SECTION (UPD63702GF: IC201)

This section can be divided into two parts.

One is the servo processing section, which handles such servo controls as error signal equalizing, in focus, track jump, and carriage move. The other is the signal processing section, which handles data decoding, error correction, and interpolation processing.

This IC converts the FE and TE signals from analog to digital and outputs the focus, tracking, and carriage drive signals via the servo block. Also, the EFM signal from the pre-amp is decoded in the signal processing section and finally output as audio signals after D/A conversion. (This IC has a built in audio digital-analog converter.) The decoding process also creates the spindle servo error signals, which is fed to the spindle servo block to create the spindle drive signal.

The focus, tracking, carriage, and spindle drive signals are then amplified by IC301, XLA6997FP and fed to their respective actuators and motors.

1) Focus Servo System

The main focus servo equalizer is in the UPD63702GF. Figure 9 is the focus servo block diagram.

In the focus servo system, the lens must be brought within the in-focus range for focus closing. Therefore, the lens is raised and lowered according to the triangular focus search voltage to find the focus point. During this time the spindle motor is kicked and kept rotating at a set speed.

The servo LSI monitors the FE signal and the RFOK signal and automatically carries out the focus close operation at the appropriate point.

Focus closing is carried out when the following four conditions are all met.

- (1) The lens is moving from far to near toward the disc surface.
- (2) RFOK = H
- (3) The FZD signal (within the IC) is latched at high.
- (4) FE = 0 (REFO reference)

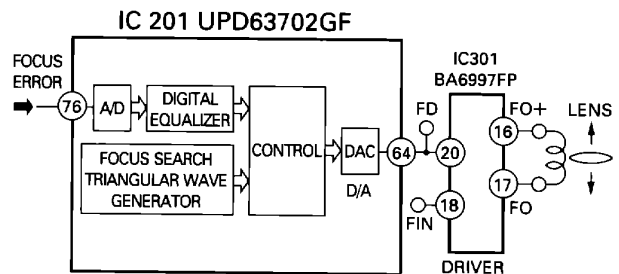


Fig.9 : FOCUS SERVO BLOCK DIAGRAM

When the above conditions are all met and the focus is closed, the XSO signal is shifted from high to low, then 40ms later, the microcomputer begins to monitor the RFOK signal that is passed through the low pass filter.

When the RFOK signal is judged to be low, the microcomputer carries out various actions such as protection.

Figure 10 shows the series of operations for focus closing (for the case where focus cannot be closed.) Also, in focus-mode-selection during test mode when the display is 01, if the focus close button is pressed, the S curve, search voltage, and actual lens movements can be checked.

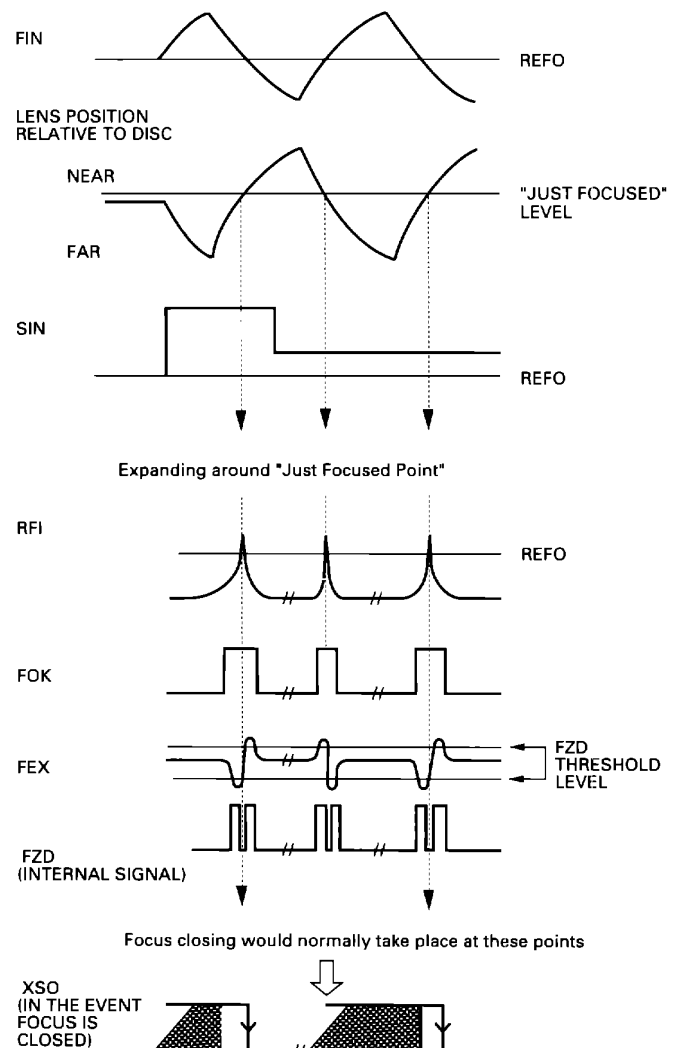


Fig.10 : FOCUS CLOSING SEQUENCE

2) Tracking Servo System

The main tracking servo equalizer is in the UPD63702GF. Figure 11 is the tracking servo block diagram.

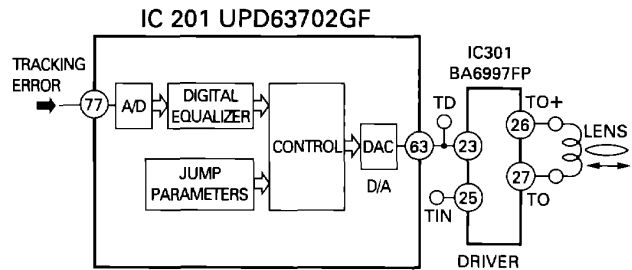


Fig.11 : TRACKING SERVO BLOCK DIAGRAM

a) Track Jump

When the LSI receives the track jump command from the microcomputer, the track jump is carried out automatically by the auto sequence function within the LSI. This system has six types of track jumps used for searches: 1, 4, 10, 32, 32×2 , and 32×3 . In test mode, in addition to these jumps, CRG moves can be executed and checked by mode selection. For track jumps, the microcomputer sets half of the total number of jumps (2 tracks for a 4 track jump) and counts the set number of tracks using the TEC signals. From the point when it has counted the set number of tracks, it outputs the brake pulse for a fixed period of time (set by the microcomputer) to stop the lens. In this way, it can close the tracking and continue normal play.

To improve the servo loop re-closing performance just after track jump, the brake circuit comes on for 60ms after the end of the brake pulse and the tracking servo gain is increased.

Fast forward and reverse operations in normal mode are realized by executing consecutive single track jumps. The speed is about 10 times as high as in normal play.

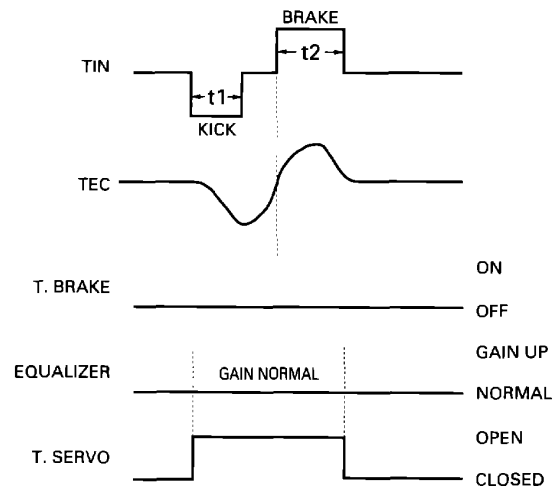


Fig.12 : SINGLE TRACK JUMP

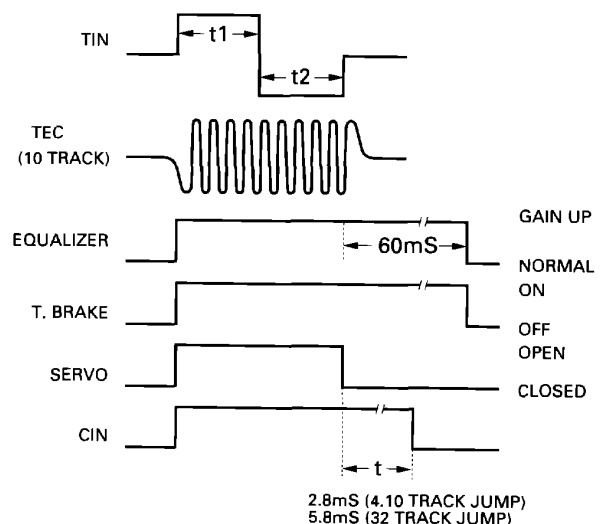
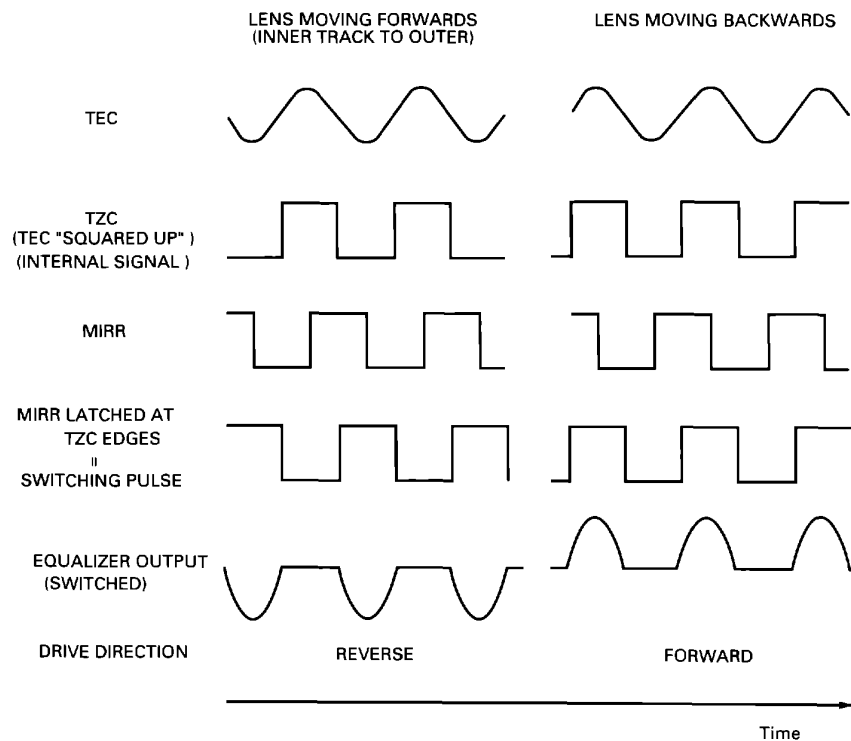


Fig.13 : MULTI-TRACK JUMP

b) Brake Circuit

This relies on determining which direction the lens is moving and only outputting the portion of the drive waveform which acts to oppose this motion. Direction of motion is deduced from TEC and the MIRR signal and knowledge of their phase relation.



Note: Equalizer output assumed to have same phase as TEC.

Fig.14 : TRACKING BRAKE CIRCUIT

3) Carriage Servo System

The carriage servo supplies the tracking equalizer's low-frequency component (lens position information) output to the carriage equalizer and after applying a fixed amount of gain, outputs the drive signal from the servo LSI. This signal is applied to the carriage motor through the driver IC.

When the lens offset reaches a certain level during play, the entire PU must be moved in the forward direction. Therefore, the equalizer gain is adjusted to output a voltage higher than the carriage motor starting voltage. In actual operations, a certain threshold level is set for the equalizer output within the servo LSI and the drive voltage is output from the servo LSI only when the equalizer output level exceeds that threshold level. This reduces power consumption. Also, due to disc eccentricity and other factors, the equalizer output voltage may cross the threshold level a number of times before the entire PU starts to move. In this case, the drive voltage waveform, (which is applied) from the LSI, becomes pulsative.

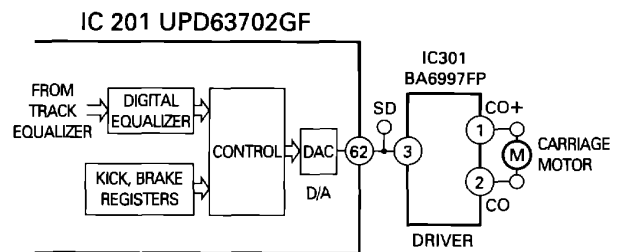


Fig.15 : CARRIAGE SERVO CIRCUIT

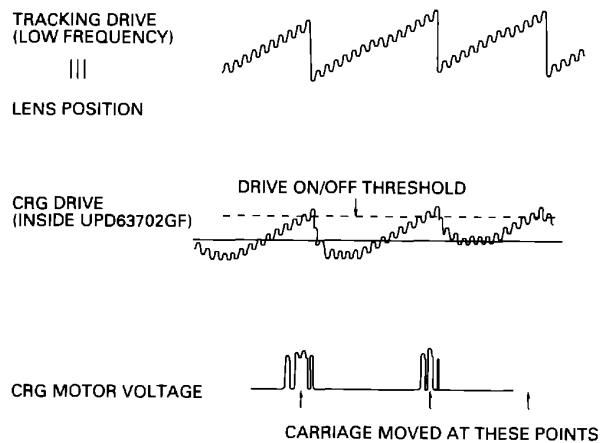


Fig.16 : CARRIAGE WAVEFORM

4) Spindle Servo System

The spindle servo has the following modes.

- (1) Kick: The mode used for disc rotation acceleration during setup
- (2) Offset:
 - a) Used during setup from the end of kick until the AGC end
 - b) Used during play when the focus is unlocked until it is recovered

Both of these are for holding the disc rotation rate near the normal rotation rate.

- (3) Adaptive servo: CLV servo mode for normal operation

In the EFM demodulation block, the frame sync signal and internal frame counter output signal are sampled each $WFCK/16$ and a signal is produced indicating whether or not they match. Only after this signal is in non-match mode eight consecutive times, is the system treated as out of sync, at other times it is treated as in sync. In this adaptive servo mode, a servo mode for pulling the system into sync is automatically selected when the system is out of sync and the regular servo is automatically selected when the system is in sync.

- (4) Brake: The mode for stopping the spindle motor rotation

The brake voltage is output by the microcomputer from the servo LSI. At this time, the EFM wave form is monitored within the LSI and if the longest EFM pattern exceeds a certain interval (when the rotation is slow enough), a flag is registered within the LSI and the microcomputer switches the brake voltage off. If the flag is not registered within a certain period of time, the microcomputer switches from brake mode to stop mode which lasts for a fixed period of time. In this case, ejection of the disc can only occur after this period of time.

- (5) Stop: The mode used during power on and ejection

At this time, the voltage across the spindle motor is 0V.

- (6) Rough servo: The mode used for carriage feed (carriage move during a long search)

The linear speed is calculated from the EFM wave form and a high level or low level is input to the spindle equalizer. In test mode, this mode is also used for the grating check.

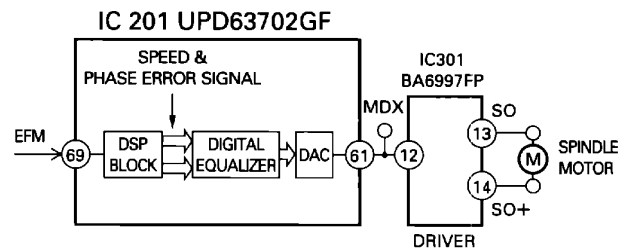


Fig.17 : SPINDLE SERVO BLOCK DIAGRAM

1.3 AUTOMATIC ADJUSTMENT FUNCTIONS

This system uses a pre-amp (UPD2572GS) and servo LSI (UPD63702GF) to automate all circuit adjustment. All adjustments are carried out automatically each time a disc is inserted or the CD mode is selected with the source key. Here is how each automatic adjustment works.

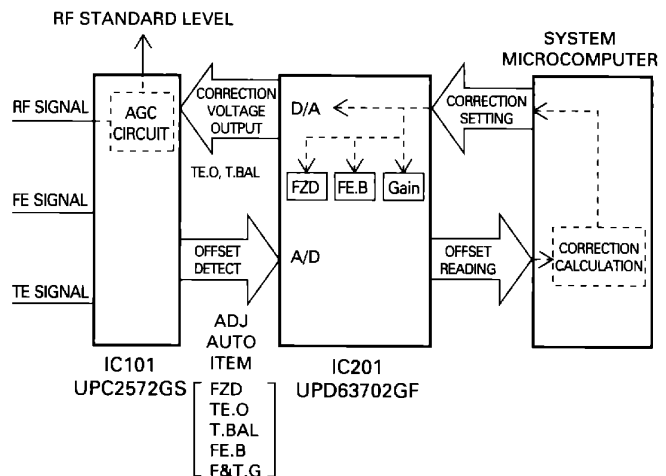


Fig.18 : AUTOMATIC GAIN CONTROL

1) FZD Cancel Setting

This setting is to make the focus closing reliable. When the power is switched on, the FE offset level is read and a voltage opposite to this offset value is written to the CRAM in the IC to cancel the offset. In this way, the FZD threshold level can be set to a constant value (+150mV) and one of the conditions within the IC for focus closing "that the FZD signal is latched at high" can be fulfilled reliably.

2) TE Offset Automatic Adjustment

This function adjusts the pre-amp TE amp offset to 0 V when the power is switched on.

The adjustment procedure is:

- (1) The TE offset (LD off) is read by the microcomputer via the servo LSI (offset = TE1).
- (2) The microcomputer calculates the voltage to be corrected from the value of TE1 and sets the output of Pin 65 of the servo LSI (signal name: TOFST). The concrete calculation method is as follows.

$$\text{TOFST2} = \text{TOFST1} + \text{TE1} \times \text{R110/R109}$$

3) Tracking Balance Automatic Adjustment

This adjustment equalizes the difference in sensitivity of the E channel and F channel of the TE output. In actual practice, the TE waveform is adjusted to be vertically symmetrical about REFO.

The adjustment procedure is:

- (1) After focus closing, the lens is kicked in the radial direction to reliably generate the TE waveform.
- (2) At this time, the microcomputer reads the peak and bottom of the TE waveform through the servo LSI.

- (3) The microcomputer calculates the value of the offset and the correction voltage to output from Pin 66 of the servo LSI (signal name: TBAL).
- (4) The voltage output from the servo LSI is input to Pin 37 of the pre-amp (IC101: UPC2572). This pin is the TEVCA amp control voltage pin. The gain for the E channel and F channel within the pre-amp is varied according to the input voltage to adjust the tracking balance and make the TE waveform vertically symmetrical about REFO.

4) FE Bias Automatic Adjustment

This adjustment is made to maximize the RFI level during play by optimizing the focus point. This adjustment utilizes the phase difference between the RF waveform 3T level signal and the focus error signal. Since an external interference is input into the focus loop, this adjustment uses the same timing as the auto gain control, explained below.

The adjustment procedure is:

- (1) External interference is injected into the focus loop by command from the microcomputer (within the servo LSI).
- (2) The RF signal 3T component level variation is detected within the pre-amp.
- (3) The phase difference between the FE signal due to external interference input and the above 3T component is detected, to sense the focus deviation direction, and the result is output as a DC voltage from Pin 30 (3T-OUT) of the pre-amp.

- (4) The 3T-OUT voltage is input to Pin 75 (A/D port) of the servo LSI and the microcomputer reads the 3T-OUT voltage through the servo LSI.
- (5) The microcomputer calculates the required correction and adjusts the focus loop offset in the servo LSI.

In the same manner as the auto gain control, this adjustment is repeated a number of times to raise the adjustment precision.

5) Auto Gain Control (AGC)

This adjustment has already been used in the previous generation of CD modules. This function automatically adjusts the focus and tracking servo loop gain.

The adjustment procedure is:

- (1) External interference is injected into the servo loop.
- (2) The error signals (FE, TE) when the external interference is injected are passed through a band pass filter and the G1 and G2 signals are obtained.
- (3) The microcomputer reads the G1 and G2 signals through the servo LSI.
- (4) The microcomputer calculates the required correction and adjusts the loop gain within the servo LSI.

To raise the adjustment precision, the same adjustment procedure is repeated a number of times.

6) Initial Adjustment Values

All the automatic adjustments use the previous adjustment value as the initial value as long as the microcomputer power supply is not cut off (the backup is not cut off). If the backup is cut off, automatic adjustment does not start from the previous adjustment value, but rather from the default setting.

7) The Coefficient Display for Adjustment Result

The results of all automatic adjustments can be displayed and checked in test mode.

The coefficient displays for each automatic adjustment are as follows.

- (1) FZD cancel, TE.OFST cancel, T.BAL, FE.bias

Reference value = 32 (A coefficient of 32 indicates that no adjustment was necessary).

The display is in units of about 40mV.

Example: FZD cancel coefficient = 35

$$35 - 32 = 3 \quad 3 \times 40\text{mV} = 120\text{mV}$$

Since the corrected value is approximately + 120mV, the FE offset before adjustment was - 120mV.

- (2) Focus and tracking gain adjustment

Reference value: Focus = 13, tracking = 20

The coefficient display shows the gain decrease relative to the reference value.

Example: AGC coefficient = 40

$$\text{Gain} = 20\log (20/40) = - 6\text{dB}$$

1.4 POWER SUPPLY AND LOADING SECTION

The power supply within the system makes the loading motor drive power supply VM (7.6V) and 5V Reg IC power (6.9V) from VD (8.3V) supplied by the mother board. The disc detection LED drive voltage and the CD driver IC power supply use VD directly.

The microcomputer switches the CD driver and laser diode on/off with "CONT" and switches the 5V power on/off with "CD5VON". There is no particular control pin for the loading motor driver, but the "EJ" and "LOAD" input signals serve the same role.

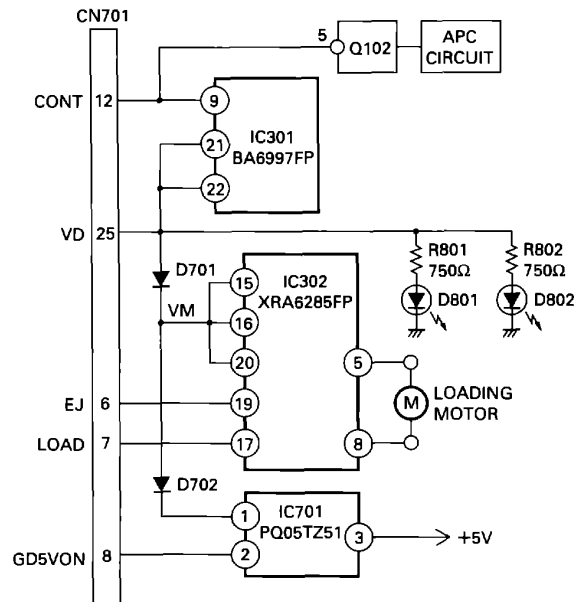


Fig.19 : POWER SUPPLY & LOADING SECTION

2. THE SUMMARY OF STRUCTURE

● Disc Loading Operations

1. There are two photo transistors before and after the rubber roller that conveys the disc. They receive light from the corresponding two LEDs. (When light is received, the photo transistor voltage is low.)
2. When a disc is inserted to just before the rubber roller, the front section photo transistor (P1) voltage goes high and the loading motor drive starts.
3. The drive power of the motor is transmitted by gear and the rubber roller rotates to transport the disc.

The rubber roller is at one end of the loading arm and lifts up the guide arm. The guide arm is positioned by two springs. Therefore the guide arm and the rubber roller provide the appropriate pressure to feed out the disc between them.

4. The clamber arm also has a disc centering mechanism that discriminates the size of the disc and clamps the disc at the center of the spindle motor. The centering arms form a set left and right on the clamber arm and can move centering on their pivots. At the end of the centering arms are the lock arms. (The lock arms rotate about the centering pins and are locked to the clamber arm for 8cm discs.)

For 12cm discs, the lock arms are unlocked and move to the position indicated in Figure 21.

The detection arm, which has its center of rotation on the centering arm on the right side of the diagram, has different positions for 8cm and 12cm discs. When one of these discs is positioned on the spindle, the detection arm moves clockwise according to the external diameter of the disc and moves the detection lever to the bottom side of the figure.

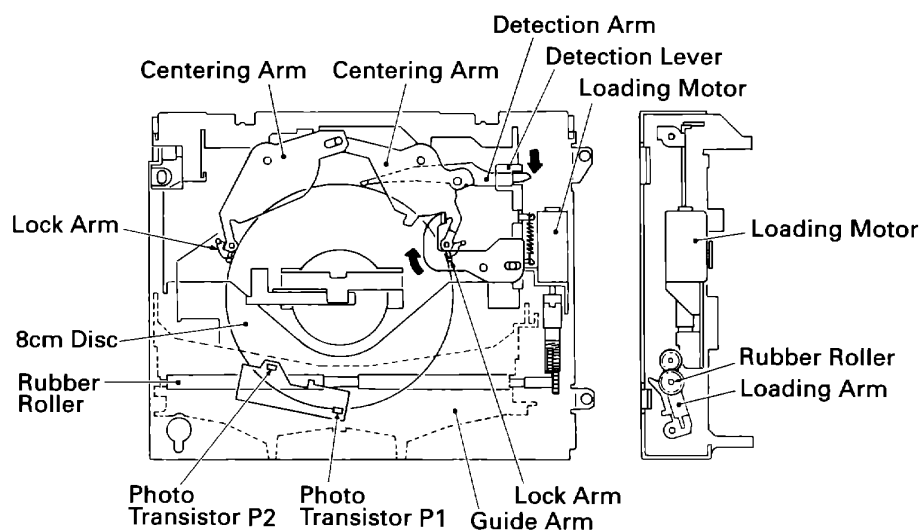


Fig.20

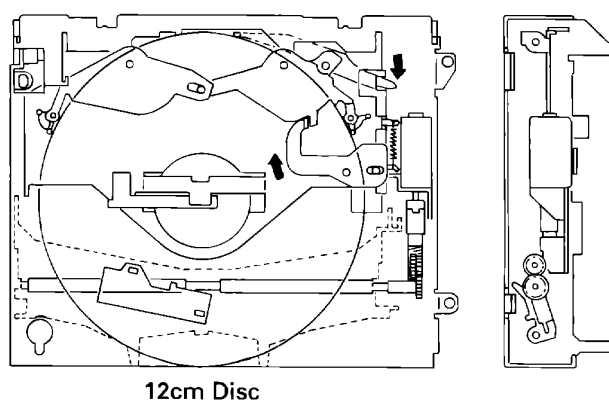


Fig.21

● Clamp Operation

The rack gear touching the detection lever meshes with the gear driven by the loading motor and rotates the L arm in the direction of the arrow in Figure 23. The clamber arm, lifted up by the L arm, descends and clamps the disc. Also, the lock lever linked with the L arm moves the loading arm. Because of this, the rubber roller descends, separating from the disc. At the same time the guide arm also descends. Loading ends at the position where the lock lever switches on the clamp switch.

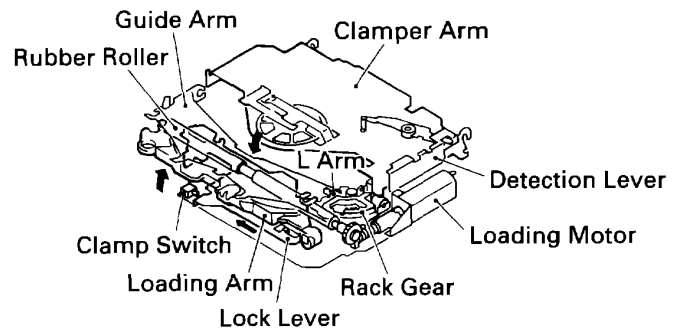


Fig.22

● Mechanism Lock Operation

1. In the eject state, both ends of the loading arm touch the bottom of the frame, the floating section front side is pushed down against the resistance of the mechanism suspension spring, and the disc insertion height position is found. For play, the loading arm rotates and the separation of the two ends from the frame bottom releases the floating section.

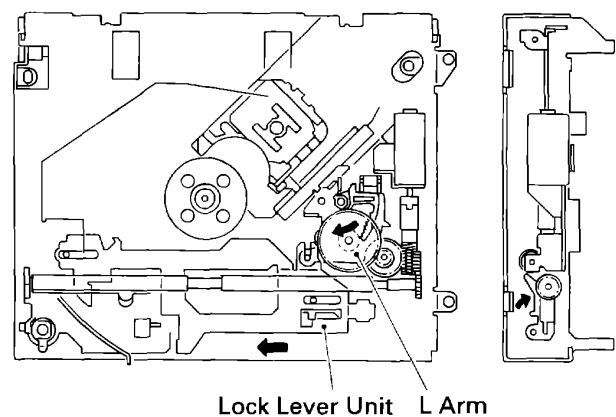


Fig.23

● Eject

1. The eject mechanism operates by reversing the rotation which takes place when the loading motor loads. The L arm moves and operates the mechanical lock, the clamp is released, the roller is applied, and the disc is conveyed. Loading stops when the photo transistor to the rear of the rubber roller (P1) is illuminated. However, in case of an 8cm disc, motor revolution stops a fixed period of time after P2 is illuminated. The disc type is recognized during play, by the voltage of the photo transistor (P1) located in front of the rubber rollers.

3. DISASSEMBLY AND ASSEMBLY

1. Remove the CD Mechanism Module

Remove in the order of the circled numbers in the disassembly diagram.

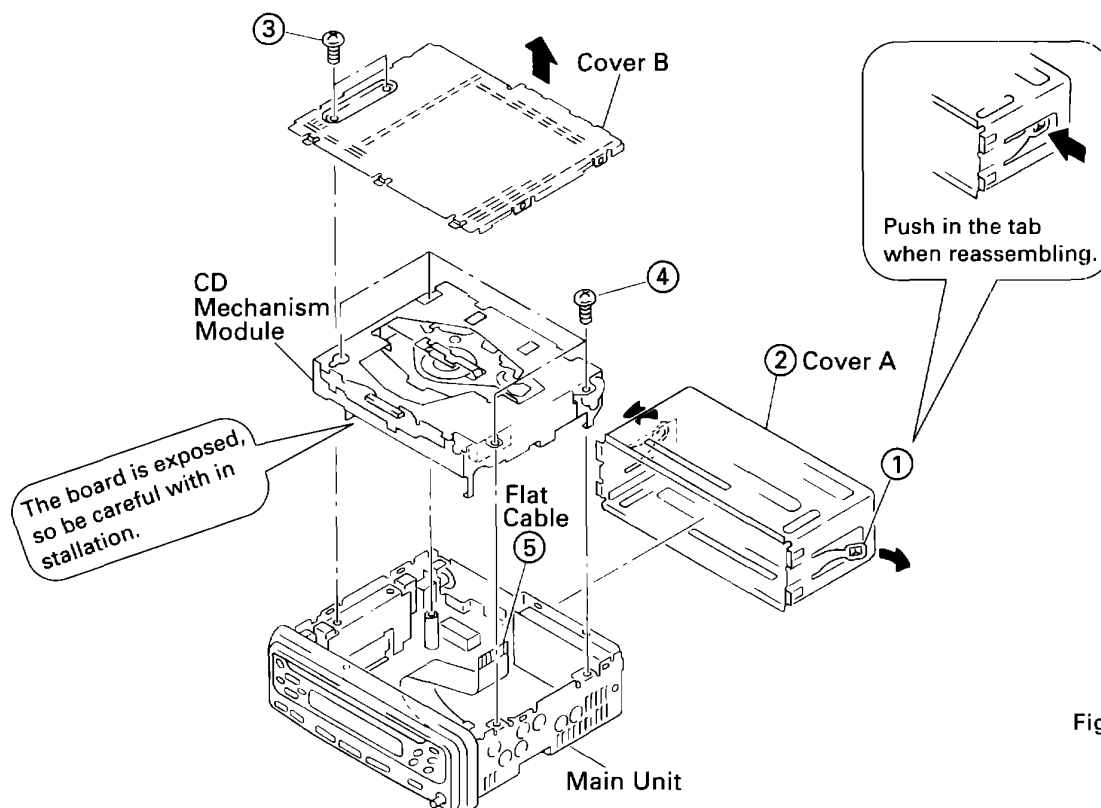


Fig.24

2. Remove the Damper and the Frame Unit

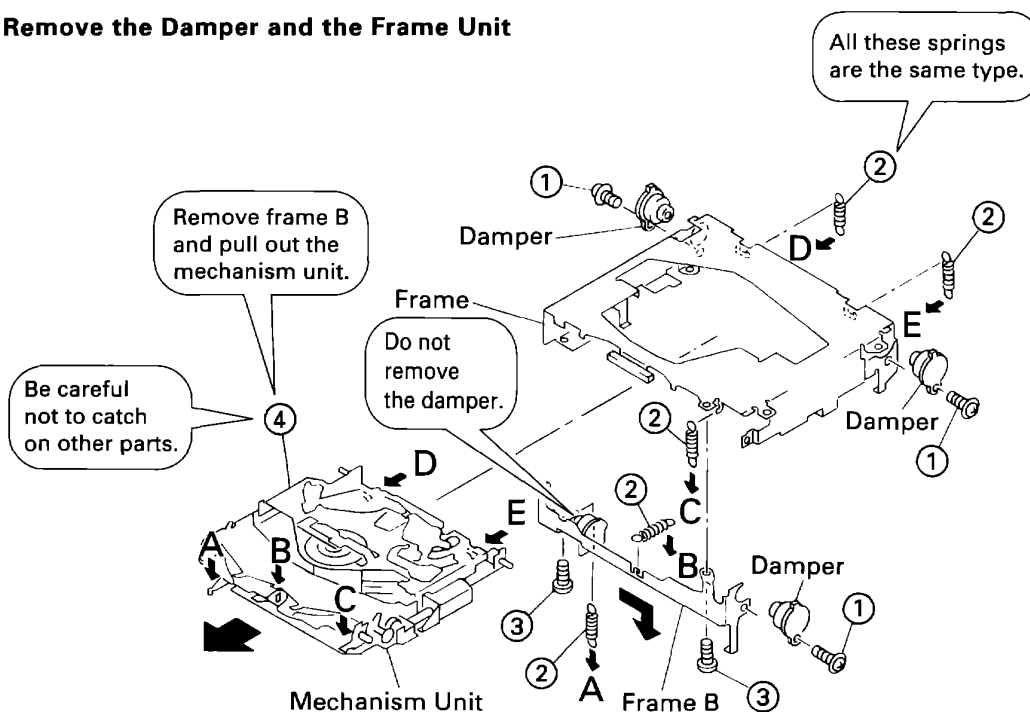


Fig.25

3. Remove the Spindle Motor

Be careful.
This work requires
considerable force
and involves the danger
of injury.

Turn the support wheel
so that the screw head
become visible through
the hole.

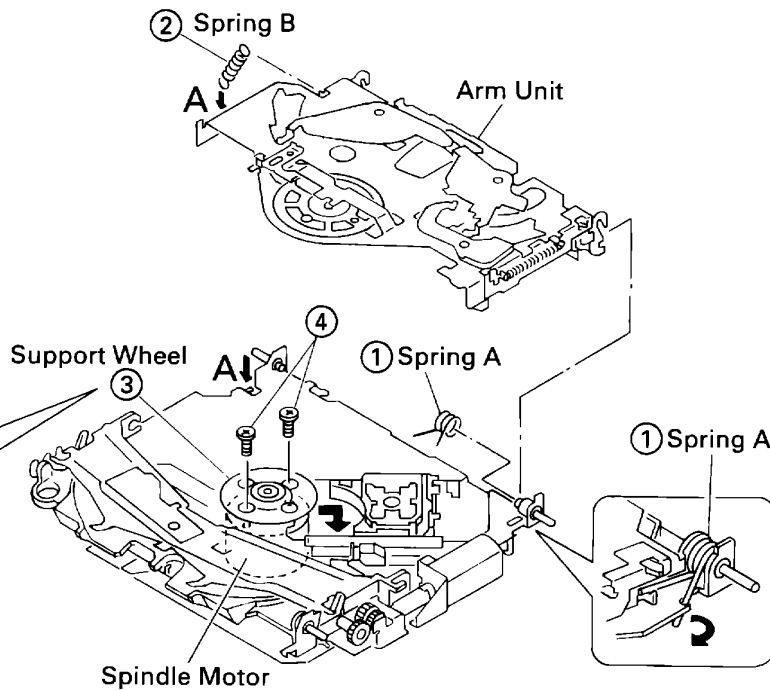


Fig.26

4. Remove the Loading Motor

Each spring
is different
type.

After raising
the guide arm
90°, remove it.

Stand the back
side of the arm,
lift up the left
then remove.

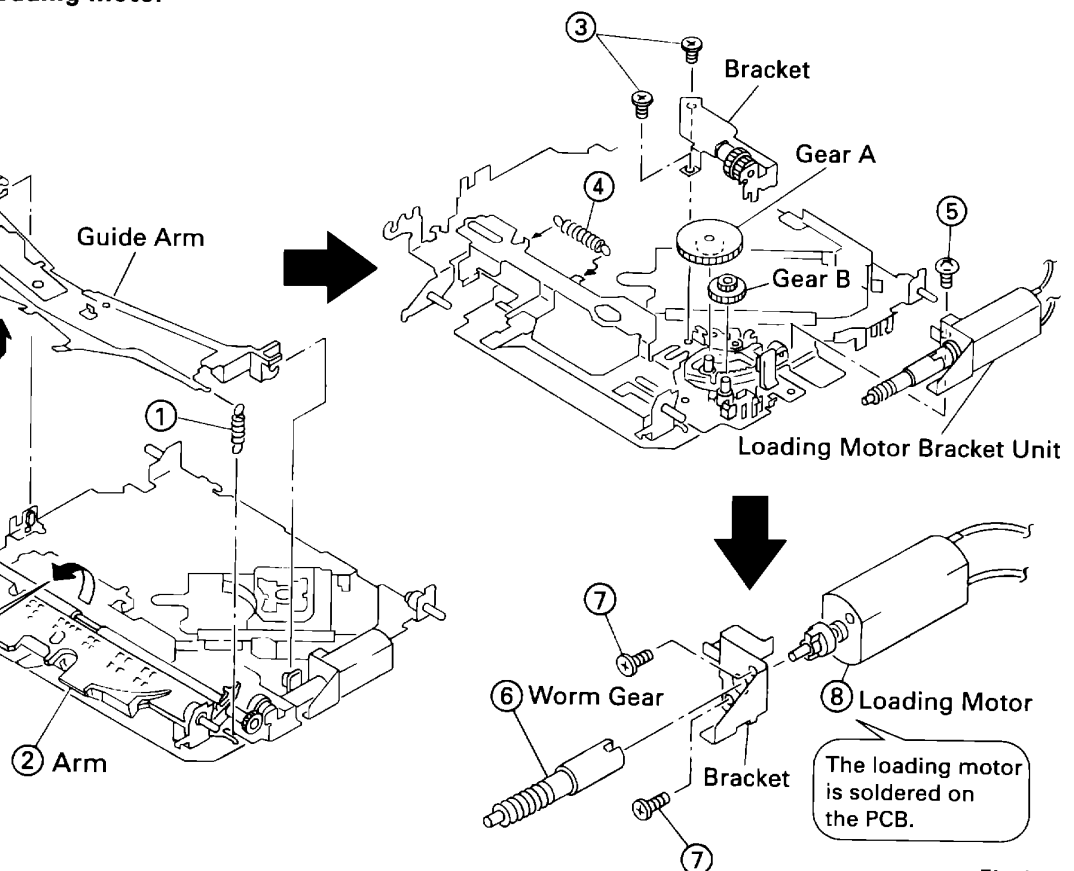


Fig.27

5. Remove the PU Unit and the Carriage Motor

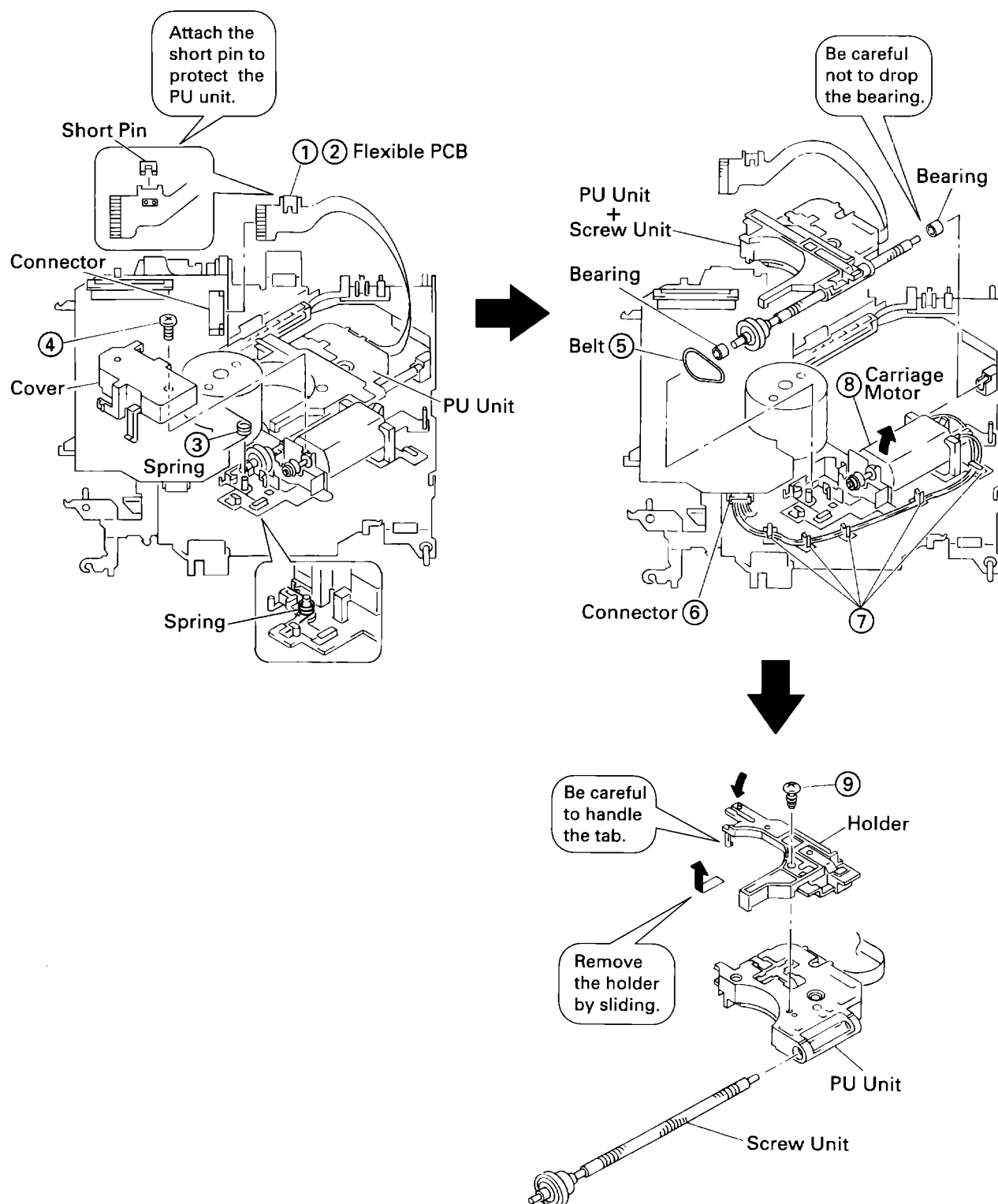


Fig.28

